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Springfield Armory Needs

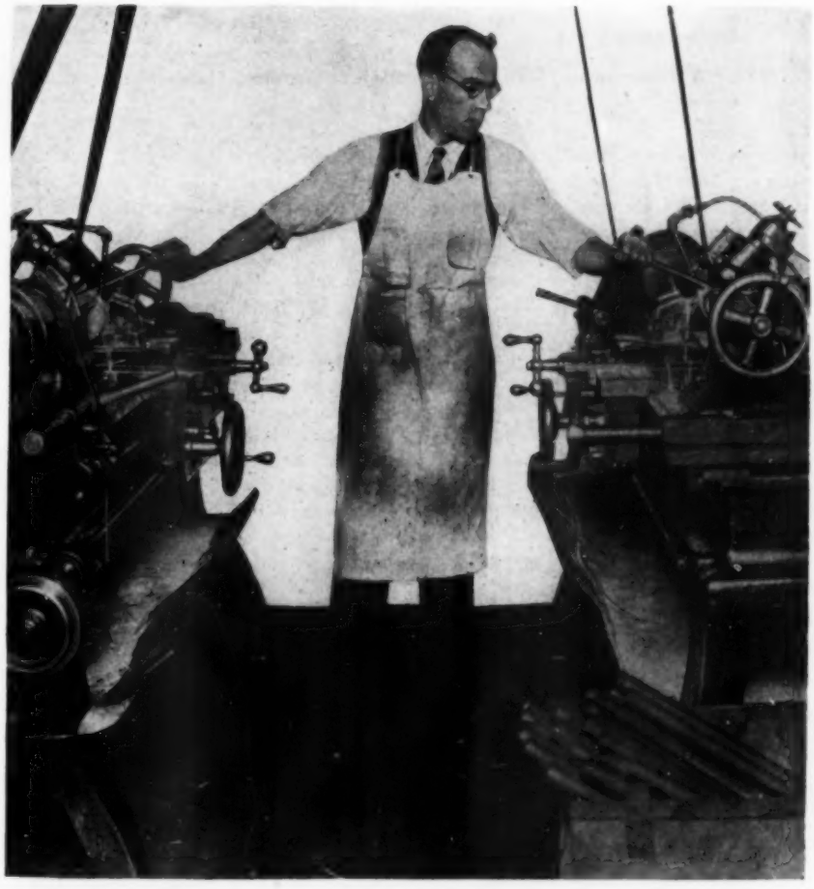
Modern machines to replace several that date from the Mexican War, more that date from the Civil War and many more that date from before the World War. Replacements would save the taxpayer appreciable sums

FRED H. COLVIN
Editor, American Machinist

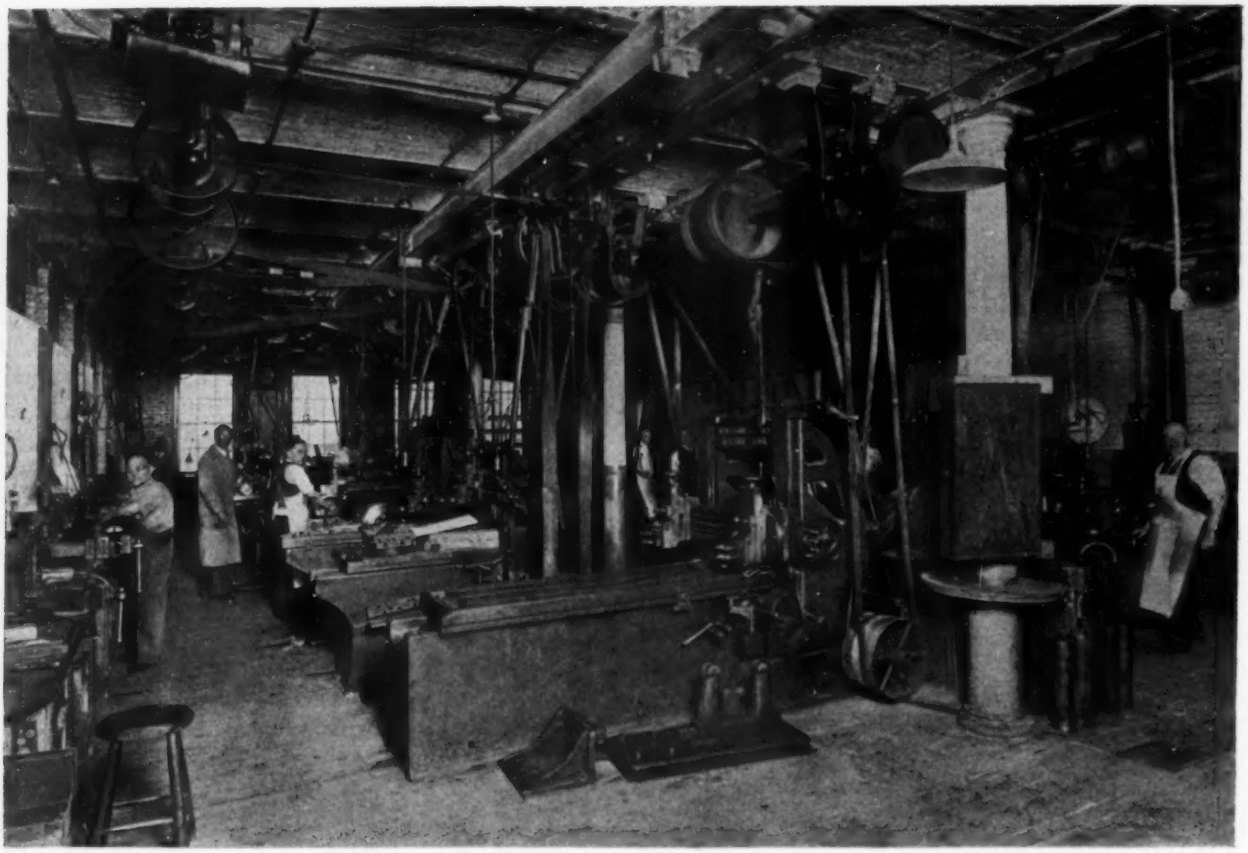
GENERAL W. H. TSCHAPPAT, Chief of Ordnance for the U. S. Army, in his excellent article (*AM*—Vol. 78, page 141), pointed out the need for and the function of arsenals. Among the points made were that "practical designs, which will meet the requirements and which will also lend themselves to economical quantity production, can only be arrived at through the construction of 'pilot' models and their thorough test." He also emphasized "the need for the government to have in its own service personnel familiar with both the production and use of its specialized ordnance material," and stated that "the bulk of the machinery at all the arsenals is of the vintage of that produced before the war or earlier." While this is a mild statement of the situation, it shows a clear appreciation of the need for new machine equipment.

A recent visit to the Springfield Armory revealed that until this year, when a few new machines are being purchased and installed, the newest machine tool was 17 years old. In fact, few were as recent as this, the average being 30 years or more. Whole batteries of milling machines are from 50 to 70 years old, and one is between 85 and 90, in spite of the fact that nearly 100 machines of nineteenth century vintage had been weeded out during the past year or so.

Springfield Armory and the other ar-



Helping out the follow-rests with a bar in each hand. Two of the old barrel turning lathes at the Water Shop, Springfield Armory



A corner of the Hill Shop, Springfield Armory. Lineshafts, countershafts, old planers, old methods

senals have been criticized for perpetuating antiquated methods. This comes, in part, from the kind of traditions that prevail in so many other lines of work, that "our work is different, other methods do not apply." A large part, however, is undoubtedly due to the deadening effect of having nothing available but unbelievably ancient machinery. With no probability of new machine tools being purchased, and with the equipment incapable of utilizing any of the newer cutting materials, there is little incentive to devise improved methods or to become familiar with new developments.

As one arsenal shop executive stated recently, "Now that we have begun to add to our equipment, the men are becoming much more alert, both to suggestions of new machines and better methods." With no incentive and with the knowledge that many of the parts for the rifle are still being made on the same machines and by the same methods that were in use during the Civil War, it is little wonder that both efficency and interest are at a low ebb.

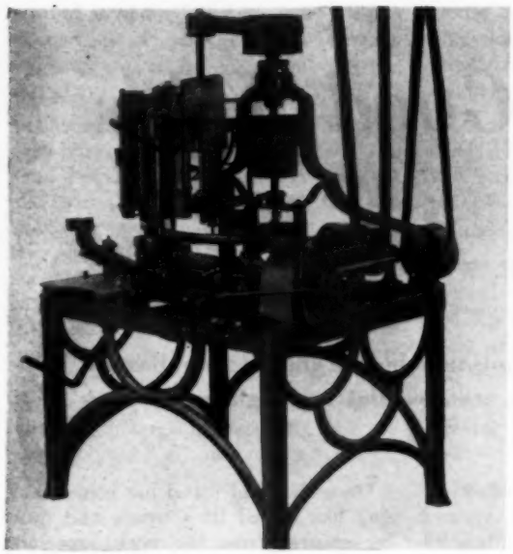
While it is true that a greater portion of the work done is on machines of later vintage than those mentioned, the machines and methods of 1901-1903 prevail in most cases. None of them are later than 1917. In the meantime much harder steels have been adopted for barrels and various parts, such as SAE 4150 for rifles and 18-8 stainless steels for machine gun parts. These new steels demand new machines and the use of the best cutting tools available. Not having these, and none of the machines being capable of using cemented carbide tools, the result has been accelerated wear on the old machines, slower cuts, less accuracy and poorer finish, with more rejections and more filing and hand fitting. All these handicaps prevent close tolerances and interchangeability and are responsible for the rapidly increasing cost.

Extra Operation Needed

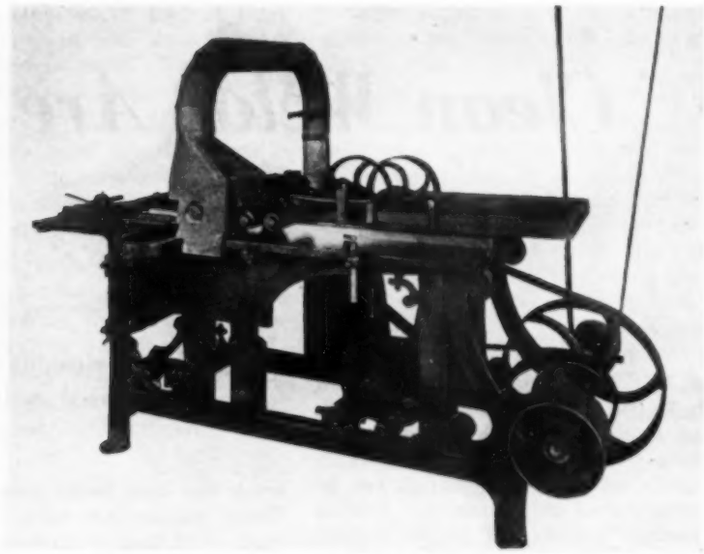
As an example, the SAE 4150 barrels show a Brinell hardness of 285 to 320; but the machines used, the newest over 17 years old, were purchased and tooled for barrels of SAE 1350 steel. As a result it takes a battery of twenty lathes to rough and finish turn sixty barrels in eight hours. And due to looseness of bearings and spring of the part, some of this because of improper support, shows so much chatter that grinding is necessary to secure a satisfactory finish.

Until the spring of 1934 no adequate threading equipment was available so that the thread at the back end of the barrel where it joins the receiver had to be chased on a toolroom lathe at the rate of ten in eight hours. One new Planetary thread miller now does ten barrels per hour.

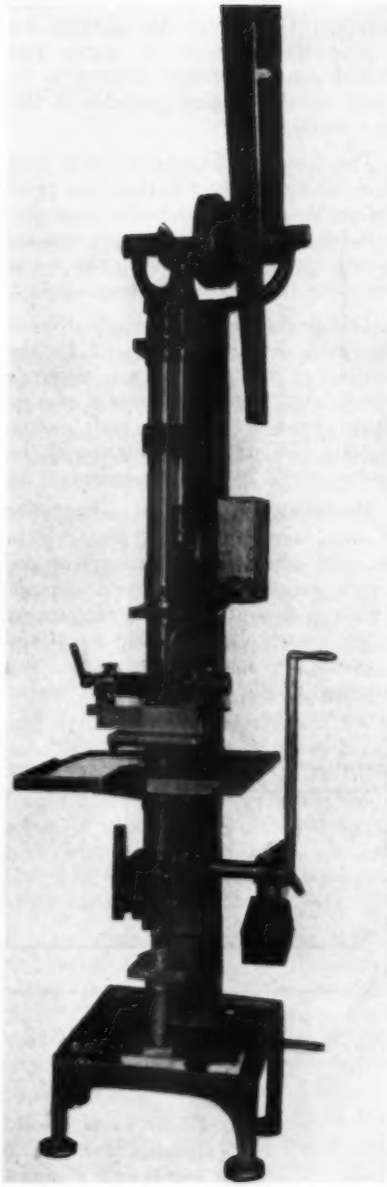
A careful survey of the equipment showed many machines that were beyond all hope of repair, but it cost $5,500 to move these out of the way. Some machines could be made serviceable by thorough overhauling, and this has been done where it seemed advisable. The machine builders themselves have completely overhauled their own machines in some cases, even to new lead screws on some of the lathes. The present management realizes that new machines are at least twice as efficient as the average present equipment. It is also making some very drastic changes in shop layout and in the arrangement of machines, and changing many of the ultra-conservative methods and ideas which are, nearly always, the heritage of old establishments.



Above—Wood profiler for gun stocks. Built in the Armory in 1853 and still on the job. Note the curves in the frame castings



Upper Right—Ball & Williams, a long forgotten firm of Worcester, Mass., built this wood molding machine in 1865



Center—Built in the Armory in 1861—still in service after 73 years

Every effort is being made to eliminate all file fits, but this can only be done by the installation of new machine equipment suitable for this work. New machinery, plus the initiative that is now being shown, can greatly increase the output and secure a better product at a lower cost.

A Bit of Interesting History

Springfield Armory, one of the first two of our government institutions for national defense, has an interesting history. Founded in 1794, two plants, the Hill Shop and the Water Shop, about a mile away, began making small arms in 1795 with 40 men, who turned out 245 muskets the first year. Harper's Ferry Arsenal, although authorized at the same time, did not begin work until 1801.

In 1810 the output of the Springfield Armory had grown to 9,700 muskets and 602 carbines. The number increased gradually until the Civil War when it jumped to 102,410 in 1862, and to 276,200 in 1865, with a cost of $10.69 per gun. This seems to have been the peak of its production. Since then it has received little attention, except during the World War, if we can judge by the machines and methods still to be found in many of the departments. Its neglect since the Civil War seems to merit the title of the "forgotten Armory." Until the Civil War the progress of the Armory had been steady and fairly rapid. Progress in machining methods is indicated by the early adoption of the Blanchard lathe, which revolutionized the making of gun stocks that had formerly been made entirely by hand. But, if we can judge by the machine equipment of the Armory today, no similar progress has been made in recent years. Machines are still in use that helped to build rifles for the Union Army in 1864! Not many, of course, date back to that year, but there are hundreds that were used in making rifles for the Spanish War, and a few that date back to the Mexican scrimmage of 1845.

Plant or Museum?

If one wishes to study the early history of American machine tools and to dig up a list of tool builders whose names are now unknown to all but a few, a visit to the Springfield Armory will be a revelation. Any number of machines there should be in Henry Ford's Museum in Dearborn. There are planers, milling machines and turret lathes, the like of which no mechanic whose experience is limited to the twentieth century has ever set eyes on.

The present management is fully alive to the need of new equipment and is desirous of improving methods, quality and output. New machinery should be made available without delay to restore efficiency.

Clean Welds Are Good Welds

E. W. P. SMITH
Consulting Engineer, Lincoln Electric Company

Effective cleaning tools used before and after application of the fused metal are essential for high grade work

GREAT importance has been placed upon the proper selection of welding generators and electrodes for various welding applications. This is rightly so, since best welding can be accomplished only when the welding machine delivers the proper current and when the electrode produces weld metal of similar characteristics to the metal of the parts being welded.

But like any other mechanical process, the quality of welding and the speed with which it is done are not determined solely by the efficiency of the welding machine nor by selection of proper electrodes. There is more to good welding than that.

Have Tools At Hand

In order that full advantage may be taken of the shielded arc process of electric welding, it is essential that the operator have near at hand all the tools needed to carry out each step of the work. Not only will the operator need an arc-welding generator, proper electrodes, an electrode holder, a shield for his eyes and face, gloves and apron, but also a wire brush, a chisel, a hammer and some suitable clamping device for holding various tools.

Depositing the electrode metal is one thing, and finishing the weld is another. Where all the emphasis is placed on the application of the electrode metal and little or none on cleaning the deposit, the quality of the work will be affected.

One of the greatest essentials of successful shielded arc welds is that the work be clean. This applies before starting to weld and during the actual welding. Unless the work is clean to start with, the heat of the electric arc will ignite any particles of grease or dirt. This foreign matter will cause sputtering during welding and may result in a weld deposit of inferior quality as compared with a weld produced on clean metal.

For cleaning the work before starting to weld, a good quality of wire brush has been found most effective. These brushes are made in various types, with long or short wire bristles and with or without an extending handle. They must be suitable for getting into corners or angles and should possess sufficient stiffness to remove tightly clinging particles of foreign matter.

The outstanding advantage of shielded arc welding is that this process protects the weld metal from the harmful effects of atmospheric contact during deposition of the weld metal and after the deposit has been applied.

This protection during application of the weld deposit is provided by the coating of the shielded arc electrode which, as it burns, produces a gaseous shield around the arc and molten metal. This prevents oxidation of the molten metal by the atmosphere.

Protection of the weld metal after it has been applied is provided in shielded arc welding by a layer of slag which forms over the weld deposit. This slag deposit keeps the atmosphere away from the molten weld metal and prevents the formation of oxides and nitrides which embrittle and weaken the weld.

Once the weld metal has cooled, this slag has served its purpose and must be removed from the work, especially when additional beads are to be applied.

For removing this slag, the operator should have handy some type of chisel. Because of its shape, the ordinary straight chisel is not effective for cleaning a weld deposit. An angle chisel, such as shown in Fig. 1, will be found much more useful in loosening the slag formation over the weld.

The angle type of the chisel is particularly valuable in welding work because of the readiness with which it can be adapted to any particular job. Different types of joints may be used to suit requirements of the work to be done. Still other adaptations can be made to the shape of the chisel's end.

For holding cleaning tools, the welding operator should have a suitable clamping device, utilizing a bar and threaded screw or a tapered notched wedge. This type of holder permits holding several different kinds of tools and will provide a handy means of using each tool most effectively. This many-purposed holder is illustrated in Fig. 2 and can be adapted to holding

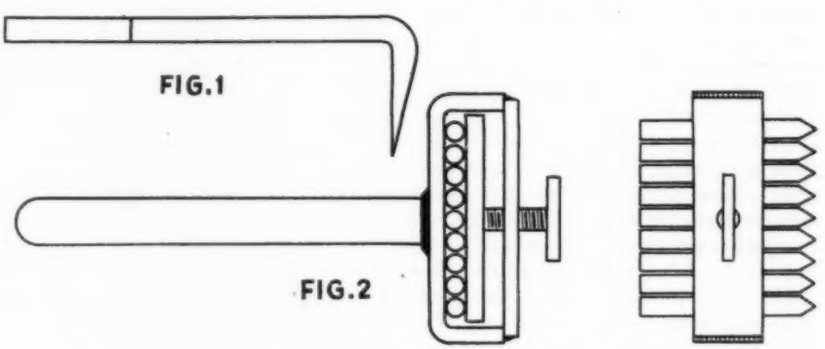


Fig. 1—An angle chisel is effective for use as a welder's cleaning tool. Fig. 2—A cleaning-tool holder permits handling a number of different tools at a time

a number of high carbon rods, ground to various shapes, or a single piece properly shaped for a particular application.

The arc-welding operator will find that the quality of his work will depend largely upon the effectiveness of his cleaning tools and upon the use which he makes of them. These tools must be the most efficient for the purpose; each welding operator should have a complete kit of his own. This is important since the time required to complete a job of welding must include every step taken from start to finish. Time will be wasted if the operator is required to leave his work to look for a wire brush, a chisel or other tool. If he has the proper tool at hand, many minutes a day and hours a month would be saved. The effect on welding costs would be considerable.

Many of the tools which a welder needs he can make himself; others he will secure more economically from a reliable manufacturer who specializes in making arc welding accessories.

But whether he makes these tools himself or purchases them, every arc welding operator should keep a complete set of them near his work. Properly used, they will aid materially in obtaining high quality welds, high welding speeds and lowered welding costs.

How Much Training—and What Kind?

JOHN R. GODFREY

"I see they're talking apprenticeship again, Godfrey. Funny how we manufacturers get all pepped up over it when we need men and how quick we drop it when the orders begin to peter out?" It was old man Johnson starting a monologue.

"Remember how our shop trained a lot of good men, and how old Bob Curtis lured 'em away as fast as he could? The old rascal used to boast that our shop trained men and he stole 'em. And even at that, the sheriff got him first.

"I've been thinking a lot about training boys lately. Partly because we're going to need more good men by next year, and partly because I'm not sure but we owe it to the industry or to the city, the same as we do taxes.

"Then, too, I've been wondering if we really know just what we should teach them, and how to go about it. Tom doesn't think our old four-year apprenticeship was so hot, in more ways than one."

"When Dad tries to tell me how hard he worked when he was a boy," broke in Tom, "I can't see why it took him four years to learn to run all the machines in the old shop he talks about.

"If I can't take any bright high school boy of working age and teach him to handle any machine in our shop in two years, I'll start raising chickens. Of course, he won't be a seasoned machinist. That takes experience. But with a two-years' background of the right training, he'll be a real workman long before the boy who messed around a bolt cutter for six months, while the boss kidded him into thinking he was learning a trade."

"You can't say Tom is a yes-man, anyhow, and he may be right about the bolt cutter at that. I still don't like to admit that the boss put one over on us, back in the old shop. Perhaps you would like to hear some of Tom's ideas about high-pressure training?"

"I wouldn't call it 'high pressure,' Uncle John," said Tom, turning to me, "I'd simply cut out most of the time you used to put on production. I'd let the practice or experience come afterward. Then, there's a point that some of you old-timers overlook," and Tom grinned, while he winked at me, "it's the teaching of what I call 'machine sense.' You boys got it by long contact with the machines themselves or picked it up from old-timers who happened to be good natured. Remember there were darned few kinds of machines to learn about in your day.

"One great fault with boys today, and many men, too, is that they haven't any, or very little, 'machine sense.' What I want to do is to train boys in the fundamental ideas of machines, so they know *why* they move this lever, or pull that knob. I want to teach them *why* work springs if you clamp it badly and stays put if you know how."

"Tom wants to give 'em a college course in mathematics, too," broke in the Old Man.

"Only enough to handle the work in the shop. A boy ought to know how to calculate gears for indexing and other things. You never had sine-bars in your day, Dad. Our toolmakers use them every day and have to know enough trigonometry to do the job. Jig-borers need a bit of figuring that wasn't necessary when you were in the shop. No man is a real machinist who can't handle these new problems.

"Maybe we weren't so good after all. I'll admit that figuring gear hobbers and spiral bevel gear cutters are beyond me. But the man who runs 'em don't have to do that, Tom!"

"I'm talking about real machinists, Dad, not operators. But I'd give operators some training on machine fundamentals, too. Then they won't kick about shifting jobs as much as they do now. In reality they are scared stiff at a new machine. Fear, both of the new machine and that they may lose out in the pay envelope, is behind most of their objections to tackle a new job.

"When it comes to training operators, Dad, you seem to forget what you did right here in our shop during the war. You used book-keepers and barbers, not to mention scrub-women, on some of your semi-automatic machine work. You've often boasted how well they did—and in some cases with a few hours' instruction. And then you want to make a bright boy work four years before he can earn less than you paid those barbers and the others."

New Plating Process Eliminates Buffing

According to *Industrial Britain*, a young Birmingham chemist has solved a problem that has been engaging the attention of the electro-plating industry for many years. He has discovered a formula which results in any article leaving the nickel or electroplating bath with a brilliant polished surface, superior to mechanical polish.

In addition to effecting considerable saving in the actual process, the discovery eliminates the necessity for labor in polishing the parts. It is estimated that production costs will be decreased by half. One effect of the discovery is that chromium plating will now become entirely a chemical process, the intermediate stage of buffing being eliminated.

Cast Plastics

HERBERT CHASE
Consulting Engineer

Plastics may be employed alone or in combination with metal without the use of expensive dies

SOME of the most beautiful types are produced in sheets, rods and tubes and are quickly converted into a large variety of machined products with little or no tooling expense. This applies especially to materials known as cast phenolics, which are available in practically any color or degree of transparency and in mottled effects resembling rose quartz, onyx, shell and other decorative materials.

These plastics are extensively employed in "dressing up" metal products and for complete articles of many types. The tools employed are the same as are used for machining metals, and operations can be performed in almost any shop where metals are worked. As the phenolics are non-inflammable, no hazards are involved in machining or storage.

The following facts, made available through the American Catalin Corporation, apply in most respects also to other materials, similar to Catalin.

Almost any metal-cutting tool can be used in machining cast phenolics, providing it is properly ground. In general, tools are ground as for machining brass. Ordinary carbon tool steel is satisfactory for most short-run work, but a smoother cut is sometimes secured by using a naval brass which has the advantage of being easily and quickly sharpened with a file without removing the tool from the holder. For long-run production jobs, high-speed steel, Stellite or cemented tungsten-carbide give excellent results and, of course, require less frequent grinding than softer materials.

High speeds and light cuts are generally recommended. Much of the work is done dry, but for very high speed machining a coolant of the non-alkaline type is desirable, soluble oils being recommended, except in abrasive cut-off operations in which a flood of water is always employed.

Avoid Overheating

Chips should come off in a long ribbon, except in abrasive cutting, and will do so if the tool is properly ground. It is important to avoid overheating the material, as this may cause discoloration, and heavy pressures on the cutting tool should not be permitted as this tends to generate heat and may deflect the piece being machined. In general, in turning and similar operations, where the work is securely held, specified dimensions can be held within 0.001 to 0.002 in. if this accuracy is required. As with some cast metals, slight shrinkage of the material may occur after machining. When extreme accuracy is required, allowance for shrinkage should be made after suitable tests. In the case of handles designed to fit tightly over a tang, and in certain other cases, shrinkage is an advantage.

For clear crystal materials, which are softer and subject to some water absorption, even lighter tool pressures and lighter cuts are advised to avoid distortion of the piece.

All cutting tools should have plenty of clearance; about 15 to 18 deg. is recommended and a zero or slightly negative rake is desirable. An ordinary ground tool is satisfactory for most work, but greater smoothness of cut is secured when the tool is honed. Lathe tools should be set approximately 1 to 2 deg. above center. In general, cutting speeds recommended range from about 200 ft. per min. upward.

Jig, circular or band saws can be used in sawing which should be done with a surface speed of about 1,200 to 1,300 ft. per min. or above. The saws should have 14 to 15 teeth per in. with just enough set to clear the saw. Intricate monograms and other fine work is often done with jig saws. As the material is free from grain, saws have no tendency to run out. Band saws which are just soft enough to permit of filing are recommended; a good saw can be used for 8 to 15 hours of sawing before sharpening.

Any properly ground drill can be used for drilling holes that are not too deep. For deep holes clogging of the drill is likely to result unless it has plenty of clearance. For such holes, twist drills with extra large flutes are used successfully or straight-fluted drills may be employed. A non-alkaline cooling compound is used to advantage in deep holes but is not essential in any drilling.

Cut-Off Wheels

For cut-off and for some carving, fine abrasive wheels are often employed. Types using a phenolic binder work well. In cutting off rods and tubes, thin abrasive wheels minimize waste; such wheels are now available in thicknesses of about $\frac{1}{32}$ in. and upward. Ten-inch wheels turning at about 3,750 r.p.m. are often used. Any of the several makes of cut-off machines can be employed but plenty of water should be fed continuously to avoid overheating of the work and

loading of the wheel. A good machine with a fine wheel and correct feed makes a smooth cut; the blanks cut off require a minimum of polishing.

Grinding of flat surfaces is usually done with sand or garnet paper, much as in sanding wood, and the finer the abrasive, of course, the smoother is the surface produced. The paper may be used in belt type sanders or as circular pieces against a face plate. Care should be used to avoid overheating the piece. The facets on irregularly shaped pieces are often ground in this way. Pieces are usually held by hand unless special accuracy is required. Grinding irregularly shaped pieces is often done with small abrasive wheels turning at high speed, say about 3,000 to 5,000 ft. per min. surface speed, depending on the shape of cut and the amount of material to be removed.

Carving Plastics

Carving and grooving is often done on such wheels, which can be formed if desired to make cuts of different section. In other cases, fine rotary steel cutting tools are also used for carving. For decorative work, in which exact location of the cuts is not essential, the piece is usually guided by hand, and experienced workers produce beautiful effects in this way. Some carving is also done by special automatic milling or similar machines designed to produce duplicate pieces at high speed. Small parts are often turned out to advantage on screw machines in exactly the way that metal screw-machine parts are produced.

Dry grinding operations naturally produce a fine dust which is preferably carried away in an exhaust system. Although the dust is no more injurious to health than most dust produced in grinding operations, it is sometimes irritating, though workers soon become accustomed to it.

Surfaces which show tool marks or grinding marks are often given a smooth surface by "ashing" which is done with wet pumice (No. 0 or finer) applied with a stitched muslin wheel preferably having a 3-in. to 4-in. face. Wheels of 12 to 14 in. diameter turning at about 1,750 r.p.m. are recommended. Similar wheels turning at the same speed are used also in polishing. This is done dry, using tripoli or other polishing compound furnished in bar form. Surfaces which are smooth and free from tool marks take on a high and permanent luster which brings out the beauty and depth of color of the material. Recessed surfaces are often left unpolished to afford a contrast with other surfaces and give an added decorative effect, especially on clear crystal types of material. Ground unpolished surfaces have a somewhat frosted apearance.

Polishing of small parts is often done by tumbling in wooden barrels first in dry pumice mixed with wooden shoe pegs to produce friction. The pumice is subsequently washed off and a final cleansing is given by tumbling in damp hard-wood sawdust. Besides pumice, there are other polishing materials, one of which, termed "pearl concentrate," has been used with much success in polishing small parts, such as buttons, turned from Catalin.

Cast phenolics can be softened somewhat by heating for a few minutes in water at 150 to 180 F. or in mixtures of hot water containing about 20 per cent of glycerine, after which moderate forming operations, such as bending, can be performed. Even blanking from thin sheet, using sharp knives can be done, but it is better to avoid operations involving sudden shocks as a rule because shattering of the piece may result. Stamping of letters, trade marks and the like can be performed with a heated die, but operations involving drawing or flowing of the material are not recommended.

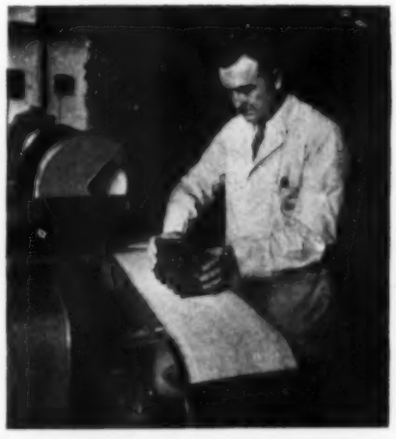
After bending over a form, which should be done with as long a radius as possible, the piece should be cooled while still in the form, using cold water to speed cooling if desired. Some spring-back may occur in formed pieces unless they are fastened so as to prevent this in the particular application. Prolonged heating should be avoided, as this tends to make the material brittle.

Fitting Handles

When handles for cutlery and similar applications are to be fastened to a tang or shank, a hole of the proper size (slightly smaller than the shank) is drilled and the portion surrounding the hole is immersed in hot water for a few minutes, after which the handle is pressed firmly over the shank. In cooling, the material shrinks slightly and adheres firmly to the shank, which is preferably knurled or somewhat roughened. No cement is required, and with reasonable care, neither cracking nor loosening result, providing the proper grade of material is used. No lacquerping, plating or other applied finish is required and there is nothing to wear or chip off in service.

Cutlery and similar handles, which are usually tapered, are generally cast separately to approximately finished size and can be had in the common sizes from standard molds. In this case, the only machining required is that for shaping the outer end of the handle and drilling for the shank or tang of the blade or other metal part. No cutting on the tapered sides of the handle is necessary, hence there is almost no waste of material.

Because of transparency and the decorative qualities of the cast phenolics, they are often applied, usually in combination with metal parts, in making lamps, display fixtures, automobile and other hardware and accessories, electrical appliances, games and sporting goods, and in a wide range of novelties and other items. Although the cost per pound is much above that for most metals, cast phenolics are much lighter than metals. Their specific gravity is about 1.3, or about half that of aluminum and about a sixth that of steel, cast iron, brass and other common alloys. In general the tensile strength is about the same as for the molded plastics, but the cast phenolics are less brittle, and breakage rarely occurs when the material is properly made and applied.



An Ideal Realized

K. H. CONDIT
Editor, American Machinist

What works manager or superintendent has not dreamed occasionally of the ideal plant he would build some day and what a wonderful place it would be to work in? Occasionally such dreams come true as with Herbert Lindner and his new plant in Wittenau, a Berlin industrial suburb

IF IT is true, as many men in the metal-working industry believe, that good work is more likely to be done in attractive surroundings where facilities are adequate than where the reverse holds true, then the work turned out by Herbert Lindner A.-G. should be almost perfect. Situated in Wittenau, a Berlin suburb twenty minutes out by rapid transit, the Lindner plant was completed in 1932. The only real difficulty encountered in the new plant has been too rapid growth. Planned for a force of 120 men it is now accommodating 200. The cause of the unexpected growth is the success of the new line of jig borers which has been added since the new plant was planned.

The beautiful surroundings of the shop typify not only the personal interest of Mr. Lindner in trees and flowers, but also the new spirit in Germany which seeks to add beauty to the utilitarianism of manufacturing. In most plants this spirit is expressing itself haltingly and rather feebly. Here, however, it has been given full sway as will be evident from the illustrations showing the trees and flowers that form a small park about the shop. Almost every man in the plant has his work so arranged that he can look out on this park.

But the ideal of pleasant surroundings has been matched by efficient arrangement of the shop equipment, the displacement of old machines by new ones (most of the old ones were left behind when the old shop was abandoned), and by payment of wages higher than the regular scale.

As one enters through the reception room he walks down a corridor on one side of which are the sales and financial offices, and on the other the manufacturing office and the designing department. Below is a modern kitchen from which a good meal is served at noon for 35 pfennigs (about 15 cents), and a comfortable dining room in which to eat it. Halfway down the corridor one turns to the right to reach the shop which is on a lower level. The supervisor thus has a good view of all that goes on.

Castings and other raw materials enter at the far end and work up through the two side halls, the flat work going up the left side and that to be turned and ground working up the right side. As the smaller parts are finished they are fed through a central subassembly department and rejoin the beds and tables for final assembly about midway of the left side. From here they continue through test and a paint shop, which is in a small bay off the main shop (a legal requirement in Berlin), to the shipping department. Two floor-operated Demag cranes serve the left side. On the right the parts are too small to need crane service.

In the center of the shop is a constant-temperature room where lead-screws and other precision parts are ground and checked. Since the Lindner jig borer

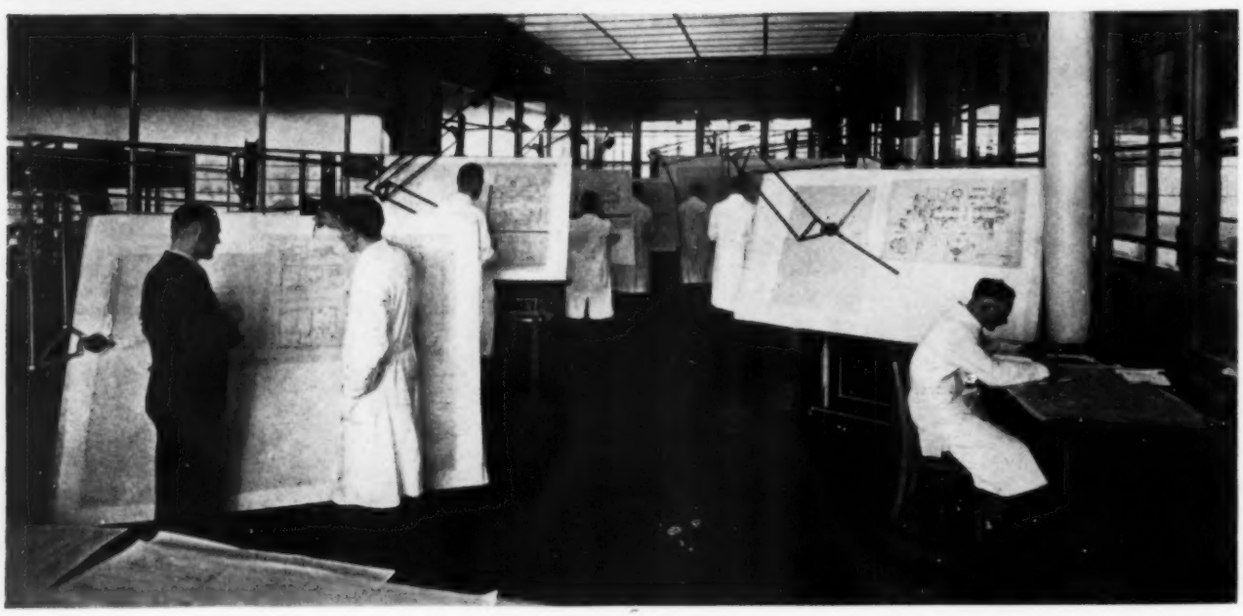
Photographs by M. Krajewsky, Charlottenburg

is accurate to 0.001 mm. a full set of precision gage blocks and Zeiss measuring instruments is in daily use.

There are no countershafts in the shop but there are some belt drive machines. For these a special drive with cast aluminum guard has been developed. A number of these units can be seen in the illustration showing a general view of the machine shop. Some idea of the construction of the building can also be had from this view, and some of the individual ventilating units can also be seen. The center skylight which has two sets of glass windows has a small car running between them for the window cleaner.

Power is supplied by a four-cylinder, 120-hp., M.A.N. diesel belted to a Garbe-Lahmayer a.c. generator. A two-cylinder diesel, similarly connected, serves as a standby unit. Both of these power units are mounted on isolated platforms supported on springs to prevent vibration being transmitted through the floor to precision machines or instruments. After the engine has been shut down at 4:30 light for the offices is supplied by storage batteries.

A constant temperature room in the middle of the shop provides the necessary conditions for precision final grinding and measuring. Adequate light and a constant view of the shop just outside their department windows help the engineers to a realistic approach to their task



Hot water for the heating pipes that run beneath the windows is supplied by twin Johannes Haag boilers with inclined grates which are fired with small anthracite through hoppers above. These units are economical and are capable of bringing the shop temperature up to 20 deg. C. very quickly.

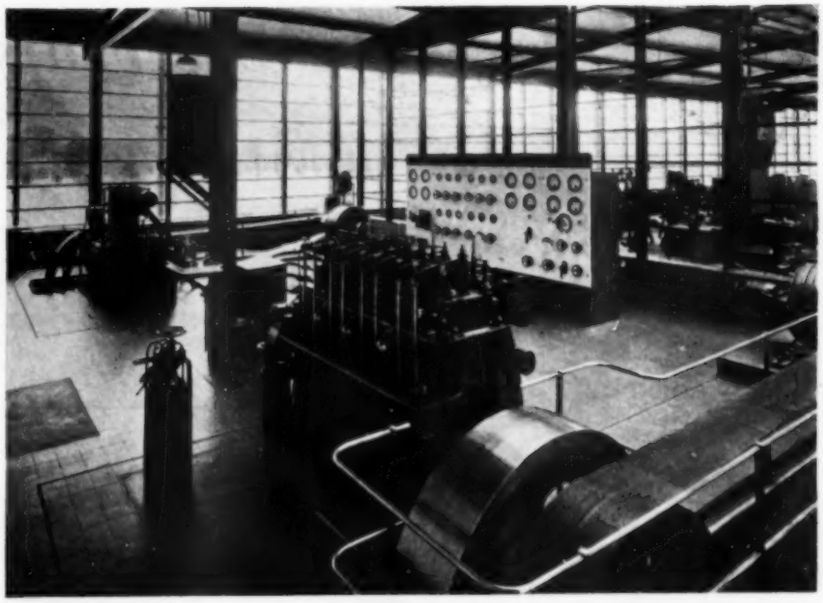
Steel storage and cutting-off machines, the pattern shop and the heat-treating department are housed in a separate building at the rear. Lindner has no foundry but does make his own patterns. The heat-treating furnaces are oil-fired.

Hours in the office are from 8 to 5:25 during the week, and 8 to 12:55 on Saturday. A 15-min. breakfast period is allowed for and a 30-min. lunch period. In the shop the hours are from 7 to 4:25 on week days and from 7 to 11:55 on Saturdays. The same recesses for eating are provided. The total number of hours worked is thus 48 per week in each department.

The average wage in the shop is now 1 mark 50 pfennigs, or 72 marks for a 48-hr. week. At the present rate of exchange this is about $30.00 per week. It should be remembered, however, that the purchasing power of any monetary unit is higher in Germany than in the United States.

As is common in German plants, partly from inclination and partly from government encouragement, this plant has a good apprentice school which now has 22 boys. All of these boys, with very few exceptions, go into the plant as they finish their training. Both the good wages and the excellent working conditions are responsible.

The illustration at the bottom of this page is clear evidence that the rear of a machinery factory building need not look like a city dump, as so many do. In this instance the territory back of the plant is quite as well kept up as the visitors' reception room at the front door.



The power plant with its main and standby diesel electric generating units represents independence of outside influences. Each unit is isolated to avoid transmission of vibration. Even a modernistic reception room can be attractive, particularly if there is an upholstered bench on which to sit. The rear of the plant is as presentable as the front

Laps for Die Finishing

CHARLES WESLOW

There are many young men who will profit by an old timer's discussion on making laps for various finishing operations on dies

FEW YOUNG MEN have an assortment of laps for small holes in hardened pieces—holes for piercing in a die, holes for dowels, and even laps for screw holes.

Many young men try to clean out a tapped hole in a hardened die with a tap. Often the tap will stick and break. Then what? Anneal the die just for that—and crack the die when rehardening in the bargain? If a brass screw is made, charged with emery, run in and out, the tapped hole can be cleaned out without running any such risk. If one has an undersize tap, it is practical to use it with a little cotton waste wrapped around the tap, to cause it to "scrape" the thread clean.

Clean Tapped Holes

In this connection, tapped holes in a die will come out clean if the holes are plugged up with screws before the die is heated. Do not worry about the screws sticking after hardening. They will not stick, simply because a scale forms around the thread of the screw in the heating, which loosens easily by turning the screw. Many tool hardeners stuff the holes with fireproof material, but it is a mean job cleaning such material out of threaded holes, and there is still a tapped hole to be lapped out; whereas if iron screws are used for plugging, all that worry is eliminated.

I have used screws in dowel holes, too, in the process of hardening. I put a washer under the head and a washer and nut on the other end. I found that this method prevents cracking more than does fireproof material, which cools more quickly in water than an iron screw.

The subject is "laps," but I was not going to miss the chance of pointing out these important matters about screw holes. The laps I refer to pertain to holes in dies and not in gages. A lot of care must be exercised in making laps for gages and fine jig bushings, but let us skip right into die holes, since that is the class of work most young men are engaged in these days.

Young men know well enough that they cannot fill the bill on work of accuracy, but that they can get away with die work, which after all is the most interesting kind of work in the trade, and in which there will be unlimited oportunities in the near future. Right now they are short of good diemakers in Chicago and even right here in the New York area, due perhaps to the fact that the concerns in need of good diemakers won't hire one over 45 years, no matter how good a mechanic he is. Because of unemployment, there are few diemakers under 30 who have had enough experience to be called experts; and furthermore, there cannot possibly be any diemakers at the age of 25 to 28, because how could they have received or gained any experience if they were not employed at the trade in all these depression years?

Slits in Lap Surface

Lap No. 1 has a pin hole in the arbor, and a screw hole in the end of the lap. A pin is driven into the hole which engages the screw in the lap, as a means for driving without slipping, and because the arbor is tapered, adjusting is feasible. The lapping surface is full of slits, but I want to point out that these slits are put in with a hacksaw holding the lap in a vise. I mark them off with the naked eye, and they are not cut like a thread; if they were the lap would possibly screw into the hole being lapped and stick. And then, where would you be?

No. 2 lap is made of cold-rolled steel and is a common lap depending on a wedge for adjusting. Such a lap is plenty good enough in many cases. The slits in this, too, were cut by hand with a hacksaw.

Nos. 3 and 4 are the same but in smaller sizes, in which I use ordinary toothpicks for wedges. No. 5 is another kind of lap, adjusted with a small screw and solid at the end. Why? Because it is made for jig bushings or for holes that must be straight out to the end and not bell-mouthed which open laps produce.

Nos. 6 and 7 are still another design. They have three saw slots, solid end, except for the hole into which a taper pin is introduced as a means for adjusting or expansion.

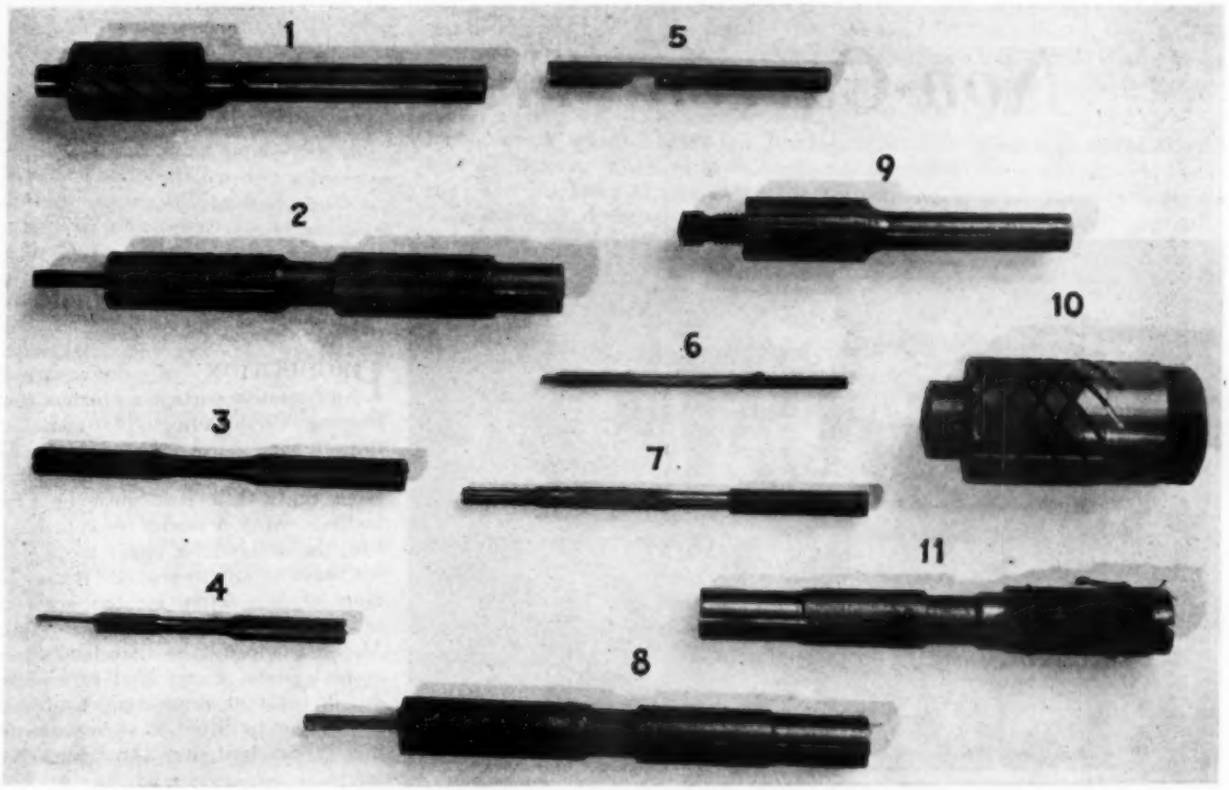
Taper Pin Fit

The only place where the taper pin fits tight is about in the center. At the end and beyond the center, the pin has clearance. This lap is for jig bushings and piercing holes in a die, providing the piercing hole has been reamed tapered before hardening. Beware, if piercing holes are not tapered for the slug to pass through, as the punches will break due to the pressure of shoving tight fitting slugs through the holes. That means annealing the die just to taper the holes. I've seen it done lots of times—dumb diemakers do that. The Bible says "ye have the poor always with you," and I'll say "we will always have dumb diemakers with us."

No. 8 lap has the slits filled with solder, which produces a fine smooth surface in a hole, after the hole has been lapped to within two tenths to size. It is used with fine dry emery (no oil).

No. 9 is adjusted with a setscrew that presses a steel ball against a taper hole at the center.

No. 10 was made for lapping a 1⅞-in. piercing hole in a die and is used in a speed lathe. The nut pulls up



A good diemaker needs a variety of laps to meet the different requirements of jobs he must handle

the head of the screw that I turned taper to about 30 deg. It was very satisfactory, and the glaze around it proves it did the proper duty.

Source of Wedges

A wooden spoon is useful not only for eating ice cream out of a paper receptacle, but I find it suitable to make wedges out of for slotted laps for adjusting. These spoons are made of maple and are just about the proper thickness for paring to a taper with a file. Often I pick up such spoons and one would think that I was a junk dealer; but I always have my mind on my vocation, unlike young men who, I surmise from their conversation, devote their minds to amusements and girls.

Lap No. 11 is wrapped with emery cloth, and is used for cleaning out the scale in a hole, thus saving a lot of time. Sometimes I use a three-cornered scraper to cut away the scale. I have a half dozen three-cornered scrapers of all sizes. The smallest goes into a hole $\frac{1}{8}$ in. in diameter. I use these scrapers for various other purposes; I have a couple of them with one corner rounded off considerably, so that it leaves but two scraping edges.

No. 11 lap is also used largely on Bakelite molds where dowl pins fit one part of the mold loosely, otherwise known as a slop fit. They must fit that way; otherwise, it would be difficult for the molder to take the hot molds apart. Such laps are also used quite a lot in polishing the corners in small machine parts and models.

I find valve grinding composition the best material to charge the laps with. In olden times we had diamond dust for small holes; that used to lap holes in a jiffy. In fact one had to be careful not to lap too much at a time due to the cutting qualities of the diamond.

I have over 100 of these laps ranging in size from $\frac{1}{8}$ to $\frac{3}{4}$ in. Some that are worn a little, I use for roughing out and the newer laps for finishing. And as I related in a previous article, "Don't lend out your laps, for others to distort and wear out for you." Those borrowers are in a hurry to get their job done—with you for a sucker to lend them your laps. When I get through working at the trade, then I will give some apprentice all my tools. I guess that will be when I win the Irish Sweeps.

And if the legs on the lathe where I am working don't stop shimmying, I'll tell you next about a jobbing shop.

Drilling Sheet Metal

A. EYLES
St. Albans, Hertfordshire, England

When using drills in sheet metal, the feed should not be heavy. The point of the drill should be at an angle of about 80 deg., instead of the usual 59 deg. When practicable, sheet metal being drilled should rest on a hardwood block, so that the drill point will be supported while the larger diameter of the drill is still cutting.

Holding sheet metal by hand when drilling is bad practice, as the drill may catch as it is breaking through and whirl the metal around, possibly causing injury to the hand. To avoid this danger the piece should be clamped securely. Looseness of sheet metal is also likely to cause breakage of the drill.

Should a hard spot be encountered when drilling sheet steel, the drill should be lubricated with turpentine, and both the speed and the feed should be reduced simultaneously, although the bluing of a drill of high-speed steel is not detrimental as is the case of a carbon steel drill. When drilling mild sheet steel or sheet steel coated with tin, use an emulsion of soap and water as a lubricant. For aluminum, either turpentine or kerosene should be used.

Non-Current Truck Parts

FRED B. JACOBS

PRODUCTION of non-current automotive parts is a problem confronting every automotive manufacturer. Such parts cannot always be made in large quantities, but at the same time, their cost must be kept normal. After a model becomes obsolete, the demand for repair parts does not cease by any means, and it may be more or less active for ten years or more. At the plant of the White Motor Company, in Cleveland, non-current parts of one kind or another are in constant production, as trucks from a few to fifteen or more years old are in constant use throughout the world.

The bulk of the repair parts demand comes from White distributors who service the majority of White trucks. When an independent repairman gets a White repair job, he orders the necessary parts from the nearest White agency. In the good old days of several years ago, little attention was paid to non-current parts inventories, except to make sure that a surplus always was on hand. Thus the inventory ran into several million dollars. Today the case is different. Both the agencies and the home plant strive to keep inventories down to a minimum that will afford efficient service.

Where non-current parts can be made in large quantities, various manufacturing operations can be performed in regular production lines in many automotive manufacturing plants. With the production of these parts for trucks, however, a different problem arises because the parts are not always

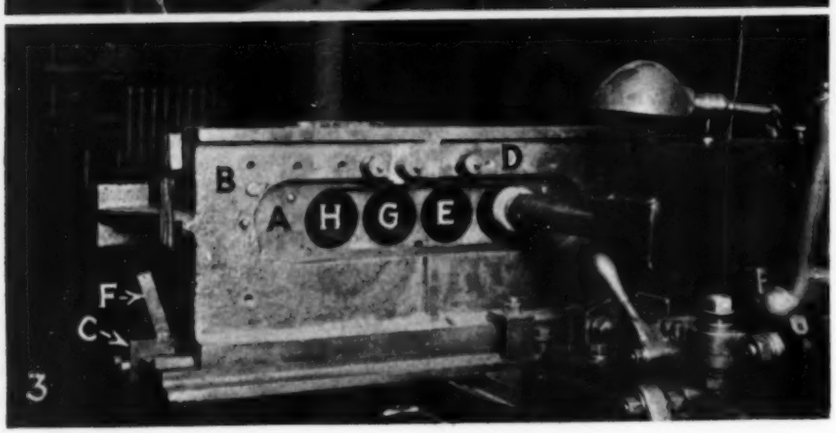


Fig. 1—Crankshafts replaced by service stations are sent in for regrinding in White's special parts department. Fig. 2—Since it is usually impractical to repair camshafts, replacements are made up in lots of 50. Fig. 3—Blocks with integral heads cannot be honed so an internal grinder is set up to finish the bores

made in large quantities. Thus, instead of several thousand parts being in production, a few hundred at most are made at one time. To eliminate the expense incurred by tearing down regular production set-ups and preparing a line for short production only, the White Motor Company solved the problem by organizing and equipping a special non-current production parts department. In this department, also, are performed a few other operations on parts sent in by the company's service departments. Crankshafts, camshafts and cylinder blocks are among such parts.

In a department, devoted to the production of only a few hundred parts at a time at most, it is, of course, not practical to install production lines. Thus the various machine tools are located to the best advantage so that backtracking is eliminated as much as possible.

A crankshaft for a six-cylinder motor is a comparatively expensive unit, and it is practicable to repair such parts by regrinding. The plan is to let enough shafts of a given model accumulate, from six to twenty-odd, and then set up a crank grinder to refinish the pins and line bearings. The ground surfaces will of course be slightly undersize, from 0.003 to 0.006 in., but as the shaft will go into a repair job and be fitted with new bearings, the undersize is of no consequence. It must not be inferred that the service stations are required to wait until enough shafts accumulate to make it worth while to set up the crank grinder. On the other hand, any service station can write, wire, or telephone for a reground shaft and have it shipped immediately. Then the shaft which the reground one replaces can be shipped back to the factory the cheapest way, usually by motor freight.

A crankshaft regrinding operation is shown in Fig. 1. This machine is a Landis crank grinder, 16x48 in., fitted with an Alundum wheel 24 in. in diameter, 1½ in. face, 46 grit, M grade. This wheel is operated at a surface speed of approximately 5,500 ft. per min. In this operation, the shaft is held between the offset fixtures, with which the machine heads are provided; the fixtures are set to give the necessary crank stroke. All pins that lie in one plane can, of course, be finished at one setting. The main bearings are ground by locating the shaft between centers. This machine is also used for finishing new non-current shafts for various models which are made up generally in lots of 50.

Camshafts cannot be reground without making the cams slightly smaller than the original specifications, and for this reason, camshaft regrinding generally is not considered a practical operation. Now camshafts for non-current motors are generally made up in lots of 50. The main bearings are ground by locating the shaft between centers in the usual way. The cams are finished, as shown in Fig. 2, on a Landis cam grinder. For a shaft with

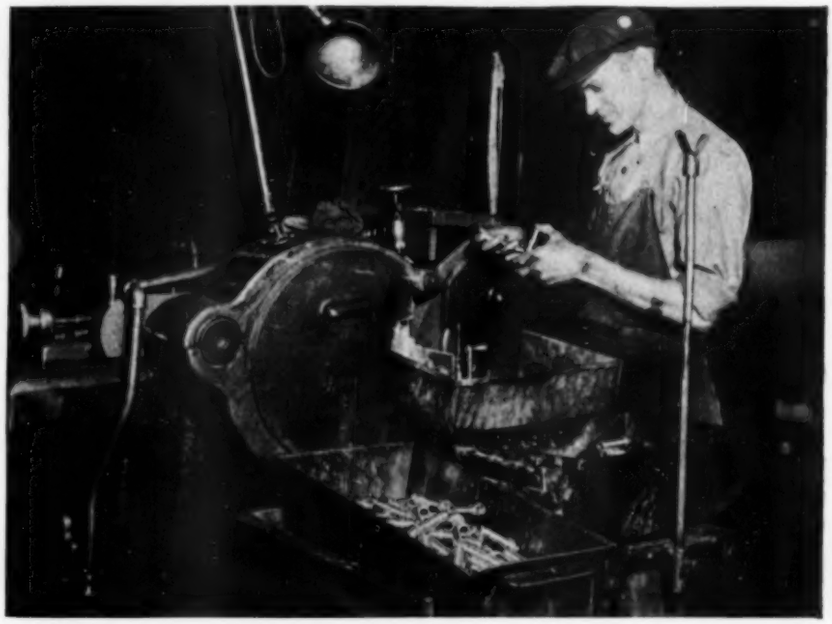


Fig. 5—Shoulder grinding on a centerless machine finishes cast-iron valve guides for replacement

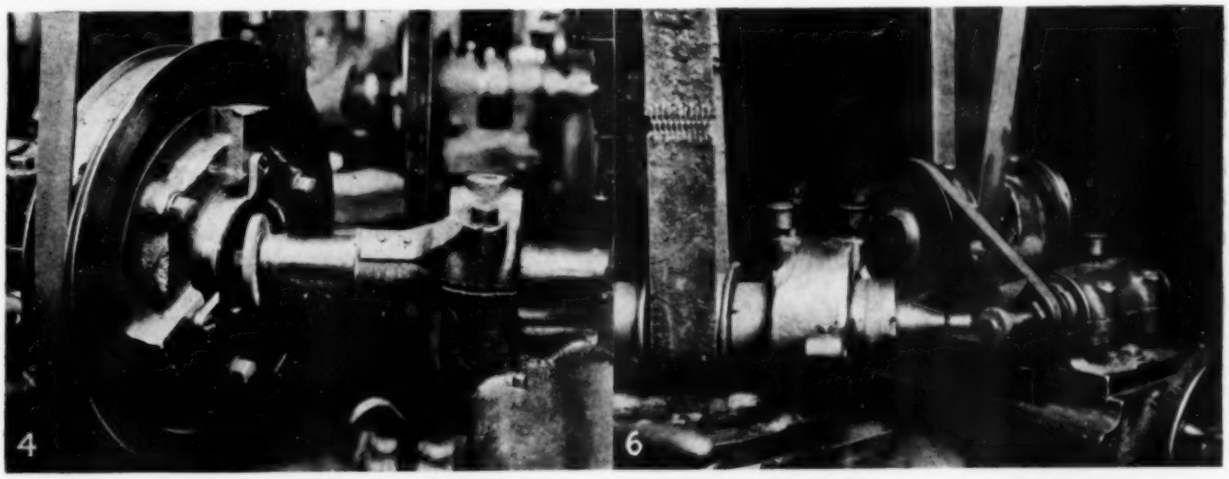


Fig. 4—As White formerly made its own ball bearings, a special replacement race is occasionally required.
Fig. 6—This set-up is retained for grinding of obsolete needle valves which are supplied now and then

eight cams, four exhaust and four intake, there must be provided a set of leader cams; thus leaders must be kept for each type of camshaft. Cams are ground with an Alundum wheel, shellac bond, 20 in. in diameter, 1 in. face, 60 grit.

Non-current motor blocks are made up in lots ranging from 50 to 200. The majority of blocks can be finished by honing, but in some instances, this is impossible. For example, since the block shown in position on the machine in Fig. 3 has an integral head, it is impossible to finish it by honing. The machine in question is a Baxter & Whitney cylinder grinder, fitted with a Carborundum wheel 2½ in. diameter, ¾ in. face, 303 grit, S grade. This wheel is operated at a surface speed of 5,000 ft. per min. while the planetary speed is 200 r.p.m. The cylinder bores, finished by grinding in this particular instance, are 3⅜ in. diameter x 9⅛ in. long. The block is bolted to a special locating plate, *A* which fits the fixture *B*. This fixture remains on the machine, and as locating plates are provided for a number of non-current blocks, one fixture serves a multiple duty.

Spacing from hole to hole is accomplished accurately by stops at each end of the fixture. For example, the fixture is against the stop *C* in position to grind bore *D*. To grind bore *E*, the fixture is moved along and the stop *F* swung down in position. Like locating means also is provided on the other end of the fixture for finishing bores *G* and *H*.

This machine and fixture also are used for regrinding cylinder blocks. When the bores are worn to considerable extent, or if they are scored slightly, the block can be made good as new by regrinding. In this operation, just enough stock is removed to clean up the bores to correct diameter for oversize pistons.

The operation, shown in Fig. 4, consists of finishing ball races on a Van Norman radial grinder. At one time, the White Motor Company made practically all its ball bearings, but this production was discontinued some years ago. Thus ball races of special design must be made occasionally to fill demands for non-current needs. The ball race fits into a special fixture, bolted to the machine head, as the illustration shows. The wheel used is Alundum, 3 in. diameter, ½ in. face, 80 grit, shellac bond. As the head carrying the work oscillates, the wheel generates the necessary ball track. This is a comparatively large bearing, 3⅜ in. diameter. As a rule, these bearings are made in lots of approximately 25 at a time.

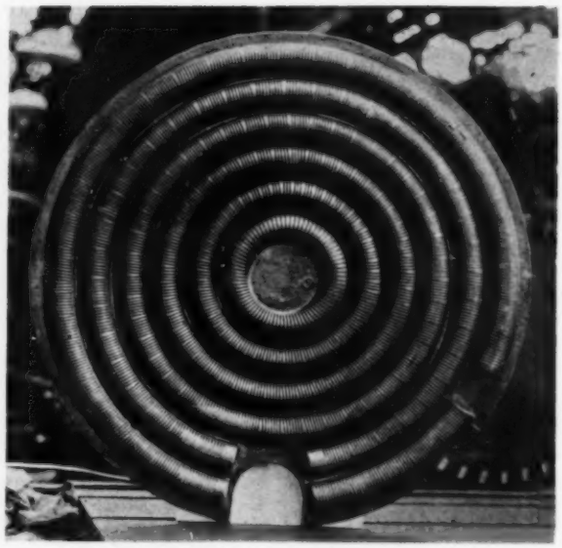


Fig. 7—A relic of the past is the burner for White steam cars in use some 30 years ago

Centerless grinding plays an important part in finishing non-current parts, as one machine can be set up for a number of operations. In Fig. 5 the operation consists of finishing cast iron valve guides. The ground surface is ⅞ in. diameter x 2⅞ in. long. In this operation, the work is ground up to a shoulder. It is located on the work rest, and the wheels are brought together. The grinding wheel is 16 in. in diameter, 4 in. face, 60 grit, medium grade and is operated at a surface speed of about 5,000 ft. per min. Usually valve guides are made in lots of 500 as there is a steady demand for them.

The part set up for grinding in Fig. 6 is a needle valve for an old model White carburetor, and while the demand for these parts is not great, occasional orders are received for them. The work is held by its stem in a split chuck while the work head is set to generate the necessary 45-deg. angle. In this position, it is fed back and forth past the wheel face. This wheel is Alundum, 1½ in. in diameter, ½ in. face, 6 grit, medium grade.

While the part shown in Fig. 7 is not finished by grinding, it serves as an excellent example of non-current parts production. This unit is a burner for the type of White steam cars in use some 30 years ago. The burner is cast iron, 21 in. in diameter, ⅛ in. thick, provided with several thousand slots 1/64 in. wide. These slots are milled on a special milling machine. The demand for these burners is not great, and the parts are made up in lots of a few every year or so. As it is not worth while to allot floor space to the special milling machine, year after year, this machine is stored, gotten out and put in operation when required.

Special Machines or Standard Lines?—Discussion

M. P. DALTON
Sevenoaks, Kent, England

The question asked by Herbert F. Crawford (*AM*—Vol. 78, page 644) is the sort of thing that causes engineers to end friendships. During twenty years of successfully beating competition in all sorts of products, I first grew to love the special-purpose machine, and then to dislike it. Today I would not have one on any account. First, because it is unresponsive to the demands of management, and second, because so far as I know, there has not been a novel machine produced during the last 50 years. A capstan lathe or an automatic screw machine are not novel; they are simply lathes with special fittings. Mixed-product experience emphatically demands the solid, simple machine. Sufficient attention is rarely paid to the development of special tools, and more particularly to special methods of handling as the means of cheapening the job.

It must be remembered that the ultimate possible cheapness is not the desirable price for the broad-minded engineer. The price of any article should not be pushed above that which beats the competitor, leaving a fair margin, because there are a thousand other things in the shop that need cheapening. Ultimate cheapness by means of the one-purpose machine is a heavy price to pay by restricting management. Who knows that but tomorrow we will prefer to redesign the part concerned?

EDITORIALS

VOLUME 79 AMERICAN MACHINIST ESTABLISHED 1877 McGRAW-HILL PUBLISHING COMPANY, INC. NUMBER 11

K. H. CONDIT F. H. COLVIN
EDITORS

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Bad Strategy

BUSINESS had forebodings when the first hints of New Deal theory began to emanate from Washington. But it had been driven almost to desperation by three years of steadily dwindling markets and it was willing to concede that possibly the theorists might be right, and to go along for a while to make sure.

It has been disillusioned. For months the disappointment was manifested only in more or less open grumbling and growling. This was bad strategy. Inarticulate groans are seldom helpful in directing remedial action to the seat of the trouble. Either the sufferer should grin and bear it, or else take active steps to cure the complaint. The latter attitude is by all means the more likely to lead to recovery.

Fortunately for the country business leadership has finally decided to kick, and to kick vigorously, against the steady encroachment of the New Dealers on the sources of wealth of this country. With very few exceptions every New Deal measure is aimed at the substitution of government control for private initiative. What makes many of these measures hard to combat is the undeniable fact that they are intended to correct evils that everyone admits. The responsibility of far sighted business men is to prove that the remedy proposed is worse than the disease and to offer constructive proposals that will really cure it.

At the recent meeting of the Chamber of Commerce of the United States business showed that it was at last thoroughly aroused to the danger of the situation. Those in attendance spoke their minds and passed resolutions that expressed their convictions. But again bad strategy marred the accomplishment. One statement was so phrased that it gave a wide open invitation to retaliation, and that invitation was accepted with alacrity.

TO OUR way of thinking the President used bad strategy in his method of treating this incident. He won a brief tactical victory and made his critics look foolish, but he unquestionably stiffened the rapidly growing opposition to the New Deal.

We hope that business will continue its constructive opposition, as vocally as possible, against the bad features of the New Deal. We pray that its pronouncements may be handled by men who understand politics and can protect business against the adroitness of political opponents.

Does It Take A War?

THIS number and that for May 8 describe the deplorable mechanical equipment of the Springfield Arsenal and the Washington Navy Yard respectively. The two articles paint a picture of inadequacy in the manufacturing facilities of these two key ordnance plants that need not be embellished here.

One fact stands out for both establishments—that a great part of the equipment now in place was acquired during times of war. Those of us familiar with the scramble for equipment during the World War know the inefficiency caused by heavy governmental demands at such a time. We can still remember government inspectors and follow-up men falling over each other, torn between adherence to ridiculous specifications and pressure to get machines quickly at any odds. We know of the orders diverted from private purchasers to government channels.

Such conditions are the result of poor planning. Government agencies such as the NRA are voluble concerning regularization of industry. They have come belatedly to recognize the importance of federal spending when private buying is lacking.

Modernization of the arsenals and navy yards is thus doubly important. Their present unfit mechanical state constitutes a dangerous military deficiency which should be at once corrected. Replacement of their obsolete equipment will regularize the metal-working industry by providing orders when few are being placed by private industry.

Such a policy will forestall governmental peak loads superimposed upon industrial booms which in the past have always resulted in unwholesome reactions. Prompt allotment of PWA funds to navy yards and arsenals is obviously for the public good.

. CHIPS .

Washington—Bonus forces hold back Patman Bill in frantic effort to muster votes enough to override the promised veto . . . House passes Bank Bill despite earnest warning of its inevitable evil effects . . . Senate balks and passes 10-month extension of NIRA contrary to Roosevelt's wishes, House promises to pass the desired 2-year renewal . . . Long fails to get Senate support for his motion to investigate Farley . . . Wagner bill is passed by Senate . . . Business Advisory Council submits list of changes in Social Security Bill which have approval of Secretary Perkins.

Foreign—Marshal Pilsudski, liberator of Poland, dies and scaremongers predict international complications . . . South Africans start movement to give Germany territory in Africa . . . Soviet decides that all iron and steel plants have had enough help and should be on a profit basis . . . Italy and Ethiopia growl more loudly at each other . . . National Policy Council is set up in Japan to curb military domination . . . Laval gets cool reception in Poland, enthusiastic one in Russia . . . Elaborate Moscow subway is finally opened . . . Swiss court decides "Jewish protocols" are obvious forgeries and sentences two Nazis . . . France and Russia invite Germany to join non-aggression pact . . . Great Britain moves to strengthen air force and defenses . . . Unemployment drops and munition stocks lead market rise in France as army orders are placed or anticipated . . . Swiss citizens are believed to be buying in France in anticipation of an early devaluation of Swiss currency with the idea of selling them and reinvesting in Swiss stocks after devaluation has taken place . . . More than 2,600 members of German Labor Front visit Madeira and Portugal in three specially fitted ships on one of Hitler's workers' vacation cruises . . . Germany plans forced loan from insurance companies to reduce short-term indebtedness . . . England's exchequer chancellor intimates that he might be ready to discuss currency stabilization.

Finance—Morgenthau suggests desirability of international currency stabilization and is supported by Hull . . . Title II of the Bank Bill is attacked vigorously as being a definite move in the direction of uncontrollable printing press inflation . . . Bank clearings up to new high for year . . . Savings Bank directors don't know what to do with excess deposits.

Industry—Roosevelt wage rate cut of 30 per cent on Work Relief projects, tentative figures vary from $16 a month for unskilled labor in the South to $96 for skilled labor in New York . . . Mutual concessions bring end of Toledo Chevrolet strike and other General Motors plants start to resume activity as transmission jam is broken . . . B. & O. dedicates steam drawn stream-lined train to run between St. Louis and Chicago . . . Representative Rayburn protests drift toward government ownership of railroads . . . Westinghouse reports $1,250,000 order for strip mill drive in Bethlehem's Buffalo plant.

Indicators—Steel production off . . . Electric power output unchanged . . . Carloadings still off . . . *Business Week's* index rises to 63.5.

James H. McGraw Honored for 50 Years of Publishing Leadership

Fifty years of leadership in business-paper publishing were acclaimed unanimously by the members of the Associated Business Papers Inc., at the annual Spring conference, May 4, at Hot Springs, Virginia. The annual dinner was turned into a surprise festivity to honor James H. McGraw, chairman of the board, the McGraw-Hill Publishing Company, Inc., publisher of *American Machinist* and a number of other business papers. Mr. McGraw had recently completed 50 years in the publishing business. Spokesmen for the A.B.P. extolled his achievements and praised his leadership and personal qualities. Following this he was presented with a testimonial scroll and a handsome watch.

In his reply Mr. McGraw outlined some of the publishing policy that he has developed in the past half century. He said, "In my opinion, the function of the business paper is (1) to advance the status of the industry it serves, and (2) to supply to the individual members a specific knowledge concerning the industry. I name these in what I regard the order of their importance. The first represents the new function, one which has become necessary during the last fifteen years. The second was formerly the major, and, in fact, almost exclusive function recognized by business papers. This change, I think, is what we mean when we say our industries are no longer merely production-minded; it really goes deeper than that.

"In fulfilling function one," Mr. McGraw continued, "which is really a leadership job, the business paper requires a new relationship to its field different to that when it was primarily a teacher. It becomes both a protagonist and a critic of its industry. The former rôle is easy, the latter one is a real job.

"There is still another new and vitally important function of the business press," Mr. McGraw pointed out, "that is to keep its readers informed as to the effect of the broader economic forces on their own busines and to interpret these as well as political and governmental action as it affects their business. This new opportunity and responsibility of the business press is a direct result of the economic and political chaos which has followed the World War."

Metal Traders Discuss New Deal; Emphasize Employee Relations Policy

Speaker after speaker at the annual meeting of the National Metal Trades Association at Cleveland, May 15 and 16, emphasized the fact that the showdown is approaching between those who believe that the American principle of individual initiative is the best basis for prosperity and those who hold that security is more important than opportunity. The point was made time after time that American business will have to take the lead in this fight and that if it is to be successful an organized and united front against those who advocate European principles must be set up.

In his presidential address Alexander Sellers pointed out that less than one per cent of the metal trades membership have suffered from labor disputes in a year marked by industrial warfare of this sort. He said further that 76 per cent of the membership had expressed vigorous opposition to the continuance of NRA and then proceeded to outline the threats to industrial peace lying in Section 7a of that act, in the Black 30-Hour Work Bill, the Wagner Industrial Disputes Bill and the Social Security Bill.

Gilbert H. Montague, New York lawyer, outlined the illegal and unconstitutional phases of NIRA and of the actions of officials holding office under its provisions. He pointed out that Washington code salaries add up to something like $12,000,000 and that code budgets totaling between $40,000,000 and $50,000,000 had been approved.

In a very thoughtful address on industrial relations Louis Ruthenburg, president of Servel, Inc., insisted that industrial management must take steps to sell its side of the case to its employees. He said that no effort has been made by management to combat the lies of the agitators and politicians who are working to force employers and employees apart. To cure such a disease there are only two remedies: segregation and immunization. Under present conditions segregation is practically impossible and the alternative is to immunize workers to subversive propaganda by stressing the theme of partnership and mutual interest.

Mr. Ruthenburg went on to say that if men believe their employers are square and if they have no grievance they cannot be made to pay dues to an outside organization. On the other hand they are not mind readers and active steps must be taken to inform them directly or through their immediate supervisors as to the policy of the company. This sort of selling and advertising must be continuous.

As effective retarders of recovery, W. B. Bell, president of the American Cyanamid Company, listed our bad banking system, the securities law and the securities exchange law, the change in the gold content of the dollar, further unbalancing of the budget, NRA, AAA, Title II of the banking act, etc. He remarked that the per capita tax in Germany is $38, in France $48, in Great Britain $91, and in the United States $79, and went on to say that enough would be saved to balance the budget next year if we substituted direct relief for work relief.

In an aggressive attack on Title II of the banking bill Malcolm Muir, president of McGraw-Hill Publishing Company, observed that a Father Coughlin or Huey Long in the White House could appoint his own Federal Reserve Board by the simple expedient of promoting each of the existing members in turn to be the governor one day

and removing him from the position of governor and from the board the next day, and then replacing him. This would naturally lead to complete control of the national credit and of the banking system, and it would be a very simple matter then to promote an uncontrollable paper inflation. As constructive substitutes for the provisions of Title II Mr. Muir suggested a unified national banking system with the various types of banking segregated; the strict limitation of the issuance of bank charters; the organization of the single bank examination department not under political influence; and the setting up of a Federal Reserve Board with a status comparable to that of the Supreme Court.

The present officers — Alexander Sellers, Wm. Sellers & Co., president; Chas. H. Strawbridge, Goodman Mfg. Co., vice-president; N. W. Pickering, Farrel-Birmingham Co., 2nd vice-president; Harold C. Smith, Illinois Tool Works, treasurer—were re-elected.

A. A. ROSS

A. A. Ross Selected to Head A. G. M. A. for the Coming Year

At its nineteenth annual convention, one of the best attended and most successful of its gatherings, the American Gear Manufacturers Association elected as president A. A. Ross, of the Lynn Works, General Electric Co. E. S. Sawtelle, of the Tool Steel Gear & Pinion Co., Cincinnati, Ohio, who is now traveling in Europe, was chosen for vice-president. For the fourth successive time J. Harper Jackson, of the Pittsburgh Gear & Machine Co., was named as treasurer. J. C. McQuiston continues as secretary of the Association. The meeting was held at the Penn-Lincoln Hotel, Wilkinsburg, Pa., on May 14 and 15.

Newly elected to membership in the executive committee for three-year terms were: L. R. Botsai, Nuttall Works, Westinghouse Electric & Manufacturing Co., and John H. Flagg of the Watson-Flagg Co. Mr. Flagg fills the vacancy left by the resignation of James Gleason of the Gleason Works, Rochester, N. Y. Old members of the executive committee reelected for new terms were: J. Harper Jackson, H. H. Kerr, Boston Gear Works and B. F. Waterman, Brown & Sharpe.

T. R. Rideout, Westinghouse Nuttall Works, was picked to fill the important post of chairman of the A. G. M. A. general standardization committee.

John Christensen, retiring president, in his opening address, told of the past year, a successful one in the Association's history, despite business and economic uncertainties that have beset most of the member companies. He briefly outlined the program for the convention and plans for future activities of the A.G.M.A.

A high spot of the opening session was an address on "Trends" by Secretary McQuiston. By historic analogies Mr. McQuiston emphasized that change is the essence of progress and then by a series of charts illustrated recent trends in the gear manufacturing industry as compared to other industrial indexes.

The afternoon session on Tuesday was addressed by S. O. Bjornberg, Illinois Tool Works, who spoke on "Inspection Methods That Give a New Conception of Gear Accuracy." Mr. Bjornberg pointed out that "trick" tooth shapes were no substitute for accuracy and described in detail a number of inspection machines and fixtures for checking gear profiles to within 0.0001 in.

R. S. Drummond, National Broach & Machine Co., Detroit, Mich., then presented a paper on "Crossed Axes Shaving of Spur and Helical Gears" in which he told of the operation of the shaving process developed by his concern.

The A.G.M.A. annual banquet held on May 14 was addressed by retiring president Christensen and president-elect Ross. Over 100 members and guests attending heard J. H. Van Deventer, Editor, *The Iron Age*, speak on "Where Do We Go From Here?" Mr. Van Deventer deplored some current economic trends but urged business men to take a constructive attitude in the promotion of their own enterprises.

On May 15, the morning session heard a paper, "Methods of Checking Gears," prepared jointly by Douglas T. Hamilton, Fellows Gear Shaper Co. and Robert Beardsley, Jones & Lamson Machine Co. Common defects in gears were illustrated by projections of gears in mesh, using the Hartness comparator. Mr. Hamilton described a number of devices available for detecting these errors and showed, by a series of slides, how gear lapping could be employed to correct them and produce smoother action.

Professor Buckingham, Massachusetts Institute of Technology, discussed proposed British Standard specifications for worm gearing. He said that these standards were the most complete with which he is familiar but had several suggestions for their improvement in design detail.

The Wednesday afternoon session was addressed by D. E. Altree, illuminating engineer, Incandescent Lamp Department, General Electric Co., on "Seeing Goes to Work in Industrial Plants." Mr. Altree commented on the fact that good lighting was no longer a matter of guess work and made specific suggestions for illumination of equipment commonly employed in gear manufacture.

Some practical phases of good heat-treatment were touched on by Jordon Korp, metallurgical engineer, Leeds & Northrup Co., in a talk on "Modern Heat-Treatment Methods and Their Application." Uniform heating, furnace control, quenching and drawing were discussed in connection with equipment used for those operations. Mr. Korp's presentation was illustrated by slides.

Immediately following the last session of the A.G.M.A., the annual meeting of the gear manufacturing industry was held. Mr. Kerr reported as chairman of the industry's code authority. This was followed by an address by Neal Foster on "Industry and/or Government." Mr. Foster stated that many of the difficulties which have arisen are caused by misunderstandings between representatives of business and of government as to the problems of the other. He cautioned against sole reliance on criticisms and protests which he contended would not change the attitude of government.

Auto Industry Resumes Stride With Settlement of Strikes

DETROIT—Before the surprise strike was called on April 23 in the Toledo Transmission Plant of the Chevrolet Motor Company, it appeared that the May production schedule for the industry would be at the same rate as that of April. Suppliers' schedules at least were arranged at nearly constant levels, but with several assembly units of Chevrolet closed for an appreciable period, a strike of A.F. of L. at the Buick plant called for the third week in May and uncertainty in other places, May's actual production can only be a guess.

In April, 477,546 units were produced which was the best month's output since 1929. April passenger sales to consumers are estimated at 335,000 with truck sales expected to run considerably ahead of the 41,511 sales in March. Early May sales are reported firm with expectations of betterment with more seasonable weather. For the week ending April 27, Chrysler dealers delivered 6.6 per cent more Plymouth and Chrysler cars than the week previous. Dodge dealers increased sales by slightly less than 2 per cent during the same period. Pontiac, unaffected by the transmission hold-up, produced to the end of April 92 per cent of the total 1934 output. Total domestic sales of General Motors units in April were 143,909 as compared with 126,691 in March. Packard is producing at the rate of 6,100 units per month, the previous high being 5,548 in October 1928. Unfilled orders are 8,836 in early May. In the final ten days of April, Olds delivered 87 per cent more cars than the corresponding period of 1934. Hudson delivered 30 per cent more cars in April than in March while Cadillac-LaSalle shipments registered a gain of 89 per cent over March.

Equipment

In the past the summer months have been slack periods for the tooling industry. At present many of the larger shops are running well above usual for this time of the year and with the expectation that this condition will spread in the next few weeks to all shops due to the earlier introduction of models. Some experimental work on new models is in process but little has reached the tooling stage, except for some summer introductions.

Production tool plants are reporting a slough off in business of from 15 to 20 per cent starting the last week in April, which came about a month earlier than last year. While a pick-up within the last few days is noted by some, the rate has not been brought back to that of March.

The machinery situation is substantially as last reported in this letter. Interest is awakening in new equipment which offers opportunity of cutting costs with some systematic inventories of present operations with that end in view. The expansion programs announced at various companies, namely Dodge truck, Olds, Pontiac, Buick and Chevrolet are favorable factors. Although standard equipment is slow, the practical exhaustion of quantities of good used equipment at present on the market will help matters in the next few months. Material handling equipment is reported as being better than in the past several years.

The A.M.A. reports that for the year ending March 31, 1935, the average hourly wage paid was 75.7c. while in 1929 this figure was 71.2c. Average weekly hours under code operation have been cut from 45.6 in 1929 to 32.6 hours, resulting in considerably less earnings per week.

The absence of violence during the Chevrolet strike is undoubtedly due to the wise policy of not attempting to keep the wheels turning in spite of all difficulties which is in marked contrast to the Toledo situation a year ago. Two weeks ago the A.F. of L. members in the Buick plant empowered their executive committee to call a strike at its discretion. May 14 was chosen by this committee for the walk-out, but deferred on advice of National A.F. of L. leaders for a membership vote. M.E.S.A. has endorsed the action of the Toledo Union and states they will handle no scab work. Dingmen from various Chrysler units are on strike, demanding a rate increase from $1.25 to $1.35 an hour and control of apprentices.

The Toledo situation is the first open defiance of the President's settle-

• INDUSTRIAL REVIEW •

• It does not seem that the pace of machinery sales set in April will be maintained during May. With the settlement of the General Motors' strikes the labor situation has definitely improved, but this in itself is not sufficient to offset the threat of new trouble if the Wagner Bill becomes a law. In the face of this and other pending legislation some hesitancy may be looked for until Congress adjourns. With European factories booked up for months ahead export business is likely to increase.

• A few orders for machinery are being placed in New England, but volume has fallen off in the past three weeks. In the New York district, May got off to a poor start with a sharp falling off of business from the April level. Last week, however, was distinctly better.

• Philadelphia is getting many inquiries but few orders—most of the orders are for the government. Some manufacturers are quoting four months' delivery on certain lines. In Pennsylvania the legislators at Harrisburg are feared as much as those at Washington and many industries may be driven from the state if present proposals are passed. Orders for single machines are coming into Pittsburgh steadily and inquiries hold up well.

• Cincinnati finds a definite slackening in sales for the first half of May with orders below the same period of last year. Toledo, just out of the throes of a strike, has little equipment business but hopes for more with labor relations stabilized.

• Detroit, too, felt the effect of labor troubles with a drop of about 50 per cent in machinery sales. With the early introduction of new auto models the summer slump is expected to be much less than last year. Orders in Milwaukee has declined decidedly since May 1. Most of the business in the last two months has been for the automotive industry although a few Navy orders have been placed.

• Both machine tool and small tool sales are slower in St. Louis, which was affected by the closing of the local Chevrolet assembly plant. Lesser labor difficulties also cloud the local industrial horizon. Volume of sales on the Pacific Coast is still small.

ment of March 1934. Rule 4 issued by the Auto Labor Board set up by this agreement states that, "Where other things above (referring to seniority rules) set out are equal, the skill and efficiency of the individual employee as determined in the judgment of the management, shall determine preference both in being kept at work and in being returned to work." The Union demands that its committee be given the right to pass on individual efficiency and discharge contrary to the terms just quoted. The company has agreed to all terms except this last one, which the Union wishes to extend to all plants through a claimed concentration of members in key positions. Auto Board voting statistics indicate around 8 per cent A.F. of L. membership in the assembly branch of the industry. After several days of negotiations, Union workers in the Toledo plant agreed Monday night, May 13, by a vote of 732 to 385 to end the strike. It was intimated that this action came only after a threat by Federation officials to suspend the local.

In one Detroit plant over 96 per cent of the workers signed a petition, originating among their own members, not to strike if called upon to do so.

Machine Tool Sales Set Five-Year Record

Domestic machine tool business in April was at the best level since 1930. The index rose from 48.5 in March to 54.4 in April, a gain of 12 per cent.

Export business declined. The index for March was 13.8, whereas in April it dropped to 11.2. The percentage of foreign orders to the total was 17 per cent, against 20 per cent for the first quarter. The spread between prices of American and foreign machines favors overseas builders in their own markets. It is, therefore, difficult for foreign orders to keep pace with the expanding domestic business.

Because of the large gain in domestic orders the total index for April advanced to 65.6 as compared with 62.3 for March. The three-month moving average on which the indices trend is based, remained stationary at 60.3. Although seasonal factors are usually unfavorable at this time of year, the present flow of new business at an even rate, and the good distribution of this business, encourage the belief that the summer let-down will not be alarming. There is, certainly, a comfortable leeway between the index of 65.6 for April of this year and of 46.5 for April of last year.

Distribution of orders, as shown in Table III, shows further improvement. The number of companies whose April business was above the industry average (60 per cent of 1926 shipments) increased from 60 to 66. The larger companies made a better showing in April than the smaller ones. Domestic business of the larger companies jumped from 48.0 in March to 54.8 in April, whereas for the smaller companies the index of domestic business declined from 55.7 in March to 48.0 in April. Both groups drew less foreign business. These figures were furnished by the industry's Supervisory Agency.

Table I—Index of Orders Based on Volume of Shipments for 1926

Month	Index of Orders: Domestic	Foreign	Total	3 Months' Average Index	% Foreign to Total Orders
1934—October	35.1	8.8	43.9	40.5	19
November	43.1	9.3	52.4	44.2	17
December	51.5	14.6	66.1	54.1	21
1935—January	52.0	13.5	65.5	61.3	20
February	41.2	10.9	53.0	61.5	20
March	48.5	13.8	62.3	60.3	21
April	54.5	11.2	65.6	60.3	17

Table II—Index of Orders—By Size of Companies

Group A—Companies reporting year's sales in 1926 of $200,000 or more:

Month	Index of Orders: Domestic	Foreign	Total	No. of Reports	% Foreign to Total Orders
1934 October	34.9	9.4	44.3	96	21
November	43.4	9.8	53.2	89	19
December	51.3	15.1	66.4	91	23
1935—January	51.6	14.3	65.9	91	22
February	42.1	11.4	53.5	98	21
March	48.0	14.4	62.4	94	23
April	54.8	11.8	66.6	94	18
Group B—Companies reporting year's sales in 1926 of less than $200,000:					
1934—October	37.5	1.7	39.2	82	4
November	38.7	2.1	40.8	82	5
December	55.6	7.3	62.9	76	12
1935—January	57.1	1.9	59.0	78	3
February	42.1	4.5	46.6	81	10
March	55.7	5.5	61.2	78	9
April	48.0	3.8	51.8	75	7

Table III—Distribution of Orders

(Shown by indexes of individual companies)

New Orders in % of 1926 Shipments	Number of Reports in Each Index Group: Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	April
200 or more	5	4	9	10	6	6	7
100–199	15	15	25	21	19	25	21
90–99	3	4	5	5	5	8	3
80–89	3	4	4	10	3	5	9
70–79	6	7	6	8	10	9	13
60–69	9	9	7	10	8	7	13
50–59	12	12	18	10	18	15	13
40–49	8	16	16	13	18	21	16
30–39	19	16	14	12	21	21	14
20–29	26	17	17	21	23	13	17
10–19	31	23	24	22	18	23	18
Less than 10	41	44	22	27	30	19	25
Total Reports	178	171	167	169	179	172	169

Chicago Machinery Club Is Strongly Reorganized

More than 143 applications have been received for charter membership in the reorganized Machinery Club of Chicago. Formal reorganization was effected May 14 with the unanimous election of Clyde W. Blakeslee, the original charter president, as president; L. Bush Rossiter, vice-president; Harry H. Brettman, secretary and treasurer. These, with C. F. Sturgeon and L. S. Nutting, comprise the board of directors. Leases were signed for the ground floor of the Machinery Sales Bldg., corner of Washington Blvd. and Jefferson St., for club quarters which will be opened early in August. The committee that effected the reorganization consisted of Messrs. Rossiter and Nutting, and J. R. Porter, chairman, J. A. Ellicson and Frank Atkins.

Arthur H. Young to Get Gantt Gold Medal

On May 24, the Institute of Management, a research group of the American Management Association, will hold a meeting and dinner at the Hotel Pennsylvania, New York, N. Y. Arthur H. Young of U. S. Steel will be presented with the Henry Laurence Gantt gold medal for "outstanding work in the field of industrial relations," at the dinner meeting. An address "Current Labor Trends" will be given by Sumner H. Slichter, professor of business economics, Graduate School of Business Administration, Harvard University.

Senate Passes Wagner Bill; Gives NRA Ten More Months

WASHINGTON—By a surprisingly large vote the United States Senate passed the Wagner Industrial Disputes Bill without much consideration of the principles involved and voted down the Tydings amendment that would have equalized to some extent the discrimination against employers. As passed the bill strikes at company unions and defines the various sorts of coercion which the employer is forbidden to use. It does nothing whatever to protect the independent workman from the kind of coercion that labor unions know so well how to apply and that is so effective in preserving the dominance of a small minority over the majority. Some of the more philosophical employers seem to feel that it may be as well to have the Wagner bill enacted and signed and tried out to prove its unworkability. They take the attitude that as long as this fight has to be faced let's do it now and get it over with.

The wishes of the President got short shrift from the Senate when the extension of NRA came up. The Clark amendment which extends the National Industrial Recovery Act for ten months from June 16 prevailed by a large vote and probably represents the wishes of the majority of business men. Several groups, however, are strongly in favor of extending the act for two years and they are likely to persuade the House to take such action.

Hearings on the banking bill have continued and a few important bankers have finally taken their business lives in their hands and explained the reasons for the united opposition to Title II of the act which comes both from banking and business. Title II, of course, puts the banking and credit structure of the country at the mercy of the political administration in power at the moment and clears the way for exactly the same kind of printing press money inflation that wiped out Germany's internal debt and reduced her great middle class to poverty.

The bonus bill has finally been sent to the President and before this appears will probably bounce back with a strong veto. Both sides in Congress are sure they can win the fight that will follow, but informed opinion seems to be that the veto will stand and that something like the Harrison compromise will be passed and approved by the President. There is a feeling that it might be better politics to put through some kind of a bonus compromise now and get the issue out of politics temporarily. Obviously it will not stay out because any encouragement given to the veterans' lobby now will simply stimulate it to demand more favors from future Congresses.

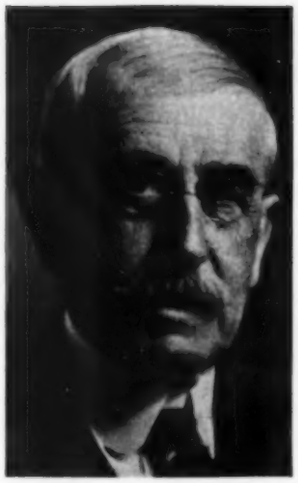
The Work Relief program is slowly getting under way with the likelihood that highway and grade crossing elimination work will produce the first employment. To expedite selection of projects likely to relieve unemployment in critical districts the country has been divided into 320 regions in which FERA has tabulated the number on relief rolls and the number who are employable and what they can do. These facts will be given consideration when a project is up for approval.

Because of the limitations of the work relief program in affording employment for the vast variety of trades which are embodied by relief labor, consideration is being given to imposing a requirement that private industries draw from relief rolls any additional labor needed to fill government orders for materials and equipment. The implication is inescapable that the orders will go to the firms which can make the best showing in expanding their payrolls.

• OBITUARIES •

ALBERT M. POWELL, for many years president of the Woodward & Powell Planer Co., Worcester, Mass., died May 6. Mr. Powell graduated from the Worcester Polytechnic Institute in 1878 and the following year he organized the Powell Machine Co. there. He was associated with MARCUS A. COOLIDGE from 1909 until 1915 when he joined the Standard Plunger Elevator Co. Five years later, with EDWARD M. WOODWARD, he formed the Woodward & Powell Planer Co., and was identified with that organization until 1927 when he resigned. Mr. Powell was 78 years old.

SIDNEY K. BECKER, works manager of the Fairfield plant of the United States Aluminum Co., died in Bridgeport, Conn., May 14, at the age of 51. Mr. Becker came to Bridgeport twenty-five years ago, when he joined the aluminum company in 1910 as Eastern sales manager.



H. F. WANNING

HENRY F. WANNING, director and member of the executive committee of the Farrel-Birmingham Co., Inc., died April 28, at the age of 89. Mr. Wanning joined the former Birmingham Iron Foundry in 1865. He was elected president of the company in 1891 and remained for thirty-seven years—until 1927, when the company merged with the Farrel Foundry & Machine Co., of Ansonia.

• PERSONALS •

VERN R. DRUM was elected president and general manager of the Hupp Motor Car Corporation. Mr. Drum has been in charge of production at the plant.

FREDERICK D. HANSEN has been elected executive vice-president and a director of the Perfex Radiator Co., Milwaukee, Wis. Prior to this appointment Mr. Hansen was secretary and general manager of the Federal Pressed Steel Co. there, which he had joined after leaving the Eddystone Ammunition Co., division of the Baldwin Locomotive Works.

A. M. JOHNSON has taken over management of the Michigan Metal Products Co., Battle Creek, Mich., May 1. Before that time Mr. Johnson was sales manager at the Covel Mfg. Co., Benton Harbor, Mich.

D. M. AVERILL, manager of the Racine division of Nash Motors since 1924, has been named works manager in charge of the Kenosha and Racine plants. Mr. Averill has been working with C. W. NASH since 1898 when he joined the Durant-Dort Carriage Co. In 1924, when Mr. Nash acquired the Mitchell Motors property in Racine, Mr. Averill was made manager of the plant.

The reorganized Read Machinery Co., Inc., York, Pa., has appointed JAMES T. DUFFY, JR., as president and T. F. FREED as vice-president in charge of sales and treasurer. Other officers are J. I. SPANGLER, vice-president in charge of operations and J. A. EADES, secretary.

A. C. OLANDER has joined the South Bend Lathe Works as sales engineer. For the past several years Mr. Olander has been connected with the Studebaker Sales Corp. as assistant to the sales promotion and advertising manager.

• MEETINGS •

AMERICAN ELECTRO - PLATERS SOCIETY. Annual meeting and exhibition, June 10-14. Pyramid Temple Mosque, Bridgeport, Conn. H. A. GILBERTSON, secretary, 234 South Wabash Ave., Chicago, Ill.

AMERICAN INSTITUTE OF ELECTRICAL ENGINEERS. Summer convention, June 24-28. Ithaca, N. Y. H. H. HENLINE, national secretary, 29 West 39th St., New York, N. Y.

AMERICAN SOCIETY OF MECHANICAL ENGINEERS. Summer meeting, June 19-21. Cincinnati, Ohio. CLARENCE E. DAVIES, secretary, 29 West 39th St., New York, N. Y.

AMERICAN SOCIETY FOR TESTING MATERIALS. Annual meeting, June 24-28. The Book Cadillac Hotel, Detroit, Mich. C. L. WARWICK, secretary, 260 South Broad St., Philadelphia, Pa.

SOCIETY OF AUTOMOTIVE ENGINEERS. Annual meeting, June 16-21. The Greenbrier, White Sulphur Springs, W. Va.

• BUSINESS ITEMS •

The Clearing Machine Corp., Chicago, has appointed CHARLES KAUDERER as Michigan representative for its line of stamping presses, air cushions and die duplicating attachments. Mr. Kauderer has been connected with the stamping and die industries for many years with Fisher Body, Mullins Manufacturing, Briggs Manufacturing and Motors Metal Manufacturing Co.

Austin-Hastings Co., Inc., has appointed Leon L. Clore to their sales engineering department. Mr. Clore, with headquarters at Worcester, will be in charge of Rhode Island and Worcester County, Mass., territories.

The E. L. Essley Machinery Co., 825-845 Rees St., Chicago, Ill., has been appointed the exclusive sales agent for Van Norman millers.

Corporation Reports

Company	1935 Earnings First Quarter	1934 Earnings First Quarter
Addressograph-Multigraph Corp	$241,432	$113,157
Baldwin Locomotive Works	*d$3,226,187	*d$3,769,587
Blau-Knox Co	$142,000	d$5,272
Chicago Pneumatic Tool Co	$165,423	$24,761
Clark Equipment Co	$23,273	$118,560
Crosley Radio Corp	*$893,746	*$413,107
Curtiss-Wright Corp	d$197,348	d$204,979
DeLong Hook & Eye Co	*$31,365	*$71,171
Evans Products Co	$250,292	$504,279
Hayes Body Corp	d$49,484	d$13,567
Kelvinator Corp	**$66,975	**d$36,419
Motor Wheel Corp	$258,124	$269,171
National Acme Co	$33,004	$58,144
Spicer Mfg. Co	$134,946	$2,704
Timken Roller Bearing Co	$2,361,937	$1,278,199
White Sewing Machine Co	d$25,923	d$37,025
Wright Aeronautical Corp	d$69,812	d$75,109
Yellow Truck & Coach Mfg. Co	d$239,968	$7,315

d—Deficit.
*—Twelve months ending March 31.
**—Six months ending March 31.

• PATENTS •

April 30, 1935

Metal-Working Machinery

Machine Tool. Harry J. Caldwell, Rockford, Ill., assigned to the Ingersoll Milling Machine Co. Patent 1,999,180.

Counterpoised Detachable Tool Head. Lawrence Lee Schauer, Hyde Park, and Jesse B. Kincaid, Cincinnati, Ohio, assigned to the Cincinnati Bickford Tool Co. Patent 1,999,197.

Valve Grinding Machinery. Charles I. Lott, Lansing, Mich. Patent 1,999,198.

Interlocked Electric Traverse and Hydraulic Clamp for Mobile Drills. Larkin R. Williamson, Cincinnati, Ohio, assigned to the Cincinnati Bickford Tool Co. Patent 1,999,225.

Screw Machine. Fred N. Tilton, Hartford, Conn. Patent 1,999,264.

Centerless Grinder. John Ryer Dunham, Highland Park, N. J. Patent 1,999,320.

Hack Saw Lift. Gideon J. Aspey, Riddle, Ore. Patent 1,999,387.

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Metal-Working Machinery

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Processes

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American Machinist

REFERENCE BOOK SHEET ©

American Standard Shafting and Stock Keys—II

Dimensions and tolerances for plain parallel stock keys, both square and flat, are given in Table 4 and are applicable to shafts up to 6 in. in diameter. These keys shall be cut from cold-finished stock and used without further machining, the dimensions and tolerances given in the table having been fixed with this consideration in mind.

Besides the key dimensions, Table 4 gives the distance from the bottom of the keyseat to the opposite side of the shaft, in order to facilitate gaging for the correct depth of keyseat when machining. This dimension is calculated on the basis of the keyseat being cut to a depth equal to one-half of the height of the key, *H*, and it should be noted that this depth is measured at the side of the keyseat, not in the central plane of the key corresponding to the shaft diameter.

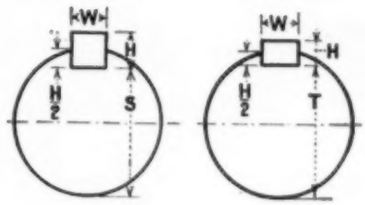


Table 4—Dimensions of Square and Flat Plain Parallel Stock Keys[1]

Shaft Diameter	Square Key W × H	Flat Key W × H	Tolerance[1,2] on W and H (—)	Bottom of Keyseat to Opposite Side of Shaft	
				Square Key S	Flat Key T
1/2	1/8 × 1/8	1/8 × 3/32	0.0020	0.430	0.445
9/16	1/8 × 1/8	1/8 × 3/32	0.0020	0.493	0.509
5/8	3/16 × 3/16	3/16 × 1/8	0.0020	0.517	0.548
11/16	3/16 × 3/16	3/16 × 1/8	0.0020	0.581	0.612
3/4	3/16 × 3/16	3/16 × 1/8	0.0020	0.644	0.676
13/16	3/16 × 3/16	3/16 × 1/8	0.0020	0.708	0.739
7/8	3/16 × 3/16	3/16 × 1/8	0.0020	0.771	0.802
15/16	1/4 × 1/4	1/4 × 3/16	0.0020	0.796	0.827
1	1/4 × 1/4	1/4 × 3/16	0.0020	0.859	0.890
1 1/16	1/4 × 1/4	1/4 × 3/16	0.0020	0.923	0.954
1 1/8	1/4 × 1/4	1/4 × 3/16	0.0020	0.986	1.017
1 3/16	1/4 × 1/4	1/4 × 3/16	0.0020	1.049	1.081
1 1/4	1/4 × 1/4	1/4 × 3/16	0.0020	1.112	1.144
1 5/16	5/16 × 5/16	5/16 × 1/4	0.0020	1.137	1.169
1 3/8	5/16 × 5/16	5/16 × 1/4	0.0020	1.201	1.232
1 7/16	3/8 × 3/8	3/8 × 1/4	0.0020	1.225	1.288
1 1/2	3/8 × 3/8	3/8 × 1/4	0.0020	1.289	1.351
1 9/16	3/8 × 3/8	3/8 × 1/4	0.0020	1.352	1.415
1 5/8	3/8 × 3/8	3/8 × 1/4	0.0020	1.416	1.478
1 11/16	3/8 × 3/8	3/8 × 1/4	0.0020	1.479	1.542
1 3/4	3/8 × 3/8	3/8 × 1/4	0.0020	1.542	1.605
1 13/16	1/2 × 1/2	1/2 × 3/8	0.0025	1.527	1.590
1 7/8	1/2 × 1/2	1/2 × 3/8	0.0025	1.591	1.654
1 15/16	1/2 × 1/2	1/2 × 3/8	0.0025	1.655	1.717
2	1/2 × 1/2	1/2 × 3/8	0.0025	1.718	1.781
2 1/16	1/2 × 1/2	1/2 × 3/8	0.0025	1.782	1.843
2 1/8	1/2 × 1/2	1/2 × 3/8	0.0025	1.845	1.908
2 3/16	1/2 × 1/2	1/2 × 3/8	0.0025	1.909	1.971
2 1/4	1/2 × 1/2	1/2 × 3/8	0.0025	1.972	2.034
2 5/16	5/8 × 5/8	5/8 × 7/16	0.0025	1.957	2.051
2 3/8	5/8 × 5/8	5/8 × 7/16	0.0025	2.021	2.114
2 7/16	5/8 × 5/8	5/8 × 7/16	0.0025	2.084	2.178
2 1/2	5/8 × 5/8	5/8 × 7/16	0.0025	2.148	2.242
2 5/8	5/8 × 5/8	5/8 × 7/16	0.0025	2.275	2.368
2 3/4	5/8 × 5/8	5/8 × 7/16	0.0025	2.402	2.495
2 7/8	3/4 × 3/4	3/4 × 1/2	0.0025	2.450	2.575
2 15/16	3/4 × 3/4	3/4 × 1/2	0.0025	2.514	2.639
3	3/4 × 3/4	3/4 × 1/2	0.0025	2.577	2.702
3 1/16	3/4 × 3/4	3/4 × 1/2	0.0025	2.704	2.829
3 1/4	3/4 × 3/4	3/4 × 1/2	0.0025	2.831	2.956
3 3/8	7/8 × 7/8	7/8 × 5/8	0.0030	2.880	3.005
3 7/16	7/8 × 7/8	7/8 × 5/8	0.0030	2.944	3.069
3 1/2	7/8 × 7/8	7/8 × 5/8	0.0030	3.007	3.132
3 5/8	7/8 × 7/8	7/8 × 5/8	0.0030	3.140	3.259
3 3/4	7/8 × 7/8	7/8 × 5/8	0.0030	3.261	3.386
3 7/8	1 × 1	1 × 3/4	0.0030	3.309	3.434
3 15/16	1 × 1	1 × 3/4	0.0030	3.373	3.498
4	1 × 1	1 × 3/4	0.0030	3.437	3.562
4 1/4	1 × 1	1 × 3/4	0.0030	3.690	3.815
4 7/16	1 × 1	1 × 3/4	0.0030	3.881	4.006
4 1/2	1 × 1	1 × 3/4	0.0030	3.944	4.069
4 3/4	1 1/4 × 1 1/4	1 1/4 × 7/8	0.0030	4.042	4.229
4 15/16	1 1/4 × 1 1/4	1 1/4 × 7/8	0.0030	4.232	4.420
5	1 1/4 × 1 1/4	1 1/4 × 7/8	0.0030	4.296	4.483
5 1/4	1 1/4 × 1 1/4	1 1/4 × 7/8	0.0030	4.550	4.733
5 7/16	1 1/4 × 1 1/4	1 1/4 × 7/8	0.0030	4.740	4.927
5 1/2	1 1/4 × 1 1/4	1 1/4 × 7/8	0.0030	4.803	4.991
5 3/4	1 1/2 × 1 1/2	1 1/2 × 1	0.0030	4.900	5.150
5 15/16	1 1/2 × 1 1/2	1 1/2 × 1	0.0030	5.091	5.341
6	1 1/2 × 1 1/2	1 1/2 × 1	0.0030	5.155	5.405

All dimensions given in inches.

[1]Note: Stock keys are applicable to the general run of work and the tolerances have been set accordingly. It is understood that these keys are to be cut from cold-finished stock and are to be used without machining. They are not intended to cover the finer applications where a closer fit may be required.

[2]Note: These tolerances are *negative* and represent the maximum allowable variation *below* the exact nominal size. For example, the standard stock square key for a 2-inch shaft has a maximum size of 0.500 × 0.500 inch and a minimum size of 0.4975 × 0.4975 inch.

Table 5—Dimensions of Large Plain Parallel Stock Keys[1]

W × H	Tolerance[1,2] on W and H (—)	W × H	Tolerance[1,2] on W and H (—)
1 3/4 × 1 1/4	0.0040	3 1/2 × 2 1/2	0.0050
2 × 1 1/2	0.0040	4 × 3	0.0050
2 1/2 × 1 3/4	0.0040	5 × 3 1/2	0.0050
3 × 2	0.0040	6 × 4	0.0050

All dimensions given in inches.

[1]Note: Stock keys are applicable to the general run of work and the tolerances have been set accordingly. They are not intended to cover the finer applications where a closer fit may be required.

[2]Note: These tolerances are *negative* and represent the maximum allowable variation *below* the exact nominal size. For example, for the standard 3 × 2-inch key the maximum size is 3.000 × 2.000 inches and the minimum size is 2.996 × 1.996 inches.

American Standard Shafting and Stock Keys—II

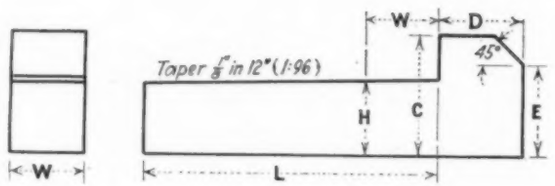


Table 6—Dimensions of Square and Flat Gib-Head Taper Stock Keys[1]

Shaft Diameter (Incl.)	Square Type					Flat Type					Tolerance[1]	
	Key		Gib Head			Key		Gib Head				
	Maximum Width W	Height at Large End[2] H	Height C	Length D	Height Edge of Chamfer E	Maximum Width W	Height at Large End[2] H	Height C	Length D	Height Edge of Chamfer E	On Width (—)	On Height (+)
1/2— 9/16	1/8	1/8	1/4	7/32	3/32	1/8	3/32	3/16	1/8	1/8	0.0020	0.0020
5/8— 7/8	3/16	3/16	5/16	9/32	7/32	3/16	1/8	1/4	3/16	5/32	0.0020	0.0020
13/16—1 1/4	1/4	1/4	7/16	11/32	9/32	1/4	3/16	5/16	1/4	3/16	0.0020	0.0020
1 5/16—1 3/8	5/16	1/4	9/16	13/32	11/32	5/16	1/4	3/8	5/16	1/4	0.0020	0.0020
1 7/16—1 3/4	3/8	3/8	11/16	15/32	13/32	3/8	1/4	7/16	3/8	5/16	0.0020	0.0020
1 13/16—2 1/4	1/2	1/2	7/8	19/32	5/8	1/2	3/8	5/8	1/2	7/16	0.0025	0.0025
2 5/16—2 3/4	5/8	5/8	1 1/16	23/32	3/4	5/8	7/16	3/4	5/8	1/2	0.0025	0.0025
2 7/8—3 1/4	3/4	3/4	1 1/4	7/8	7/8	3/4	1/2	7/8	3/4	5/8	0.0025	0.0025
3 3/8—3 3/4	7/8	7/8	1 1/2	1	1	7/8	5/8	1 1/16	7/8	3/4	0.0030	0.0030
3 7/8—4 1/2	1	1	1 3/4	1 3/16	1 3/16	1	3/4	1 1/4	1	13/16	0.0030	0.0030
4 3/4—5 1/2	1 1/4	1 1/4	2	1 7/16	1 7/16	1 1/4	7/8	1 1/2	1 1/4	1	0.0030	0.0030
5 3/4—6	1 1/2	1 1/2	2 1/2	1 3/4	1 3/4	1 1/2	1	1 3/4	1 1/2	1 1/4	0.0030	0.0030

All dimensions given in inches.

[1]Note: Stock keys are applicable to the general run of work and the tolerances have been set accordingly. They are not intended to cover the finer applications where a closer fit may be required.

[2]Note: This height of the key is measured at the distance W, equal to the width of the key, from the gib head.

Table 5 gives the dimensions and tolerances of flat keys only, for shafts larger than 6 in. in diameter, the square type having been omitted as it is not generally applicable in these larger sizes. Because of the special design considerations generally encountered in installations requiring shafts over 6 in., the range of shaft diameters corresponding to the key size is not included in this table.

Dimensions, tolerances and stock lengths of gib-head taper keys are given in Tables 6 and 7. The taper is $\frac{1}{8}$ in. in 12 in. and shall run the full length of the key, *L*.

The keyseat in the shaft, for a taper key, is the same as that for the corresponding size of parallel key, the depth of the keyseat being taken as one-half the height of the key, measured at a point, a distance equal to the key width *W*, from the large end. At this point the cross-sections of corresponding sizes of parallel and taper keys are identical.

The distance from the bottom of the keyseat to the opposite side of the shaft for taper keys may, therefore, be obtained by referring to Table 4 and using the value of this dimension as given for the corresponding parallel key and shaft size.

The tolerances on shaft diameters, widths and heights of parallel keys, and widths of taper keys are negative, the exact nominal size in each instance being the maximum. In the case of the heights of taper keys, however, the tolerance is positive and the exact nominal size, therefore, is the minimum.

The "stock" keys as covered by this standard are applicable to the general run of work and the tolerances have been set accordingly. They are not intended to cover the finer applications where a closer fit may be required.

Table 7—Stock Lengths of Gib Head Taper Stock Keys

Shaft Diamter (Incl.)	Length of Key[1] (L)						
1/2— 9/16	1/2	3/4	1	1 1/4	1 1/2	1 3/4	2
5/8— 7/8	3/4	1 1/8	1 1/2	1 7/8	2 1/4	2 5/8	3
13/16—1 1/4	1	1 1/2	2	2 1/2	3	3 1/2	4
1 5/16—1 3/8	1 1/4	1 7/8	2 1/2	3 1/8	3 3/4	4 3/8	5 1/2
1 7/16—1 3/4	1 1/2	2 1/4	3	3 3/4	4 1/2	5 1/4	6
1 13/16—2 1/4	2	3	4	5	6	7	8
2 5/16—2 3/4	2 1/2	3 3/4	5	6 1/4	7 1/2	8 3/4	10
2 7/8—3 1/4	3	4 1/2	6	7 1/2	9	10 1/2	12
3 3/8—3 3/4	3 1/2	5 1/4	7	8 3/4	10 1/2	12 1/4	14
3 7/8—4 1/2	4	6	8	10	12	14	16
4 3/4—5 1/2	5	7 1/2	10	12 1/2	15	17 1/2	20
5 3/4—6	6	9	12	15	18	21	24

All dimensions given in inches.

[1]Note: The minimum stock length of keys is equal to four times the key width, and the maximum stock length is equal to sixteen times the key width The increments of increase in length are equal to twice the width.

Veneer Knife Grinding

JOHN E. HYLER

In grinding an ideal edge on a veneer knife it is presupposed that the workman has some knowledge of how the knife is used and of the theory of veneer cutting. In cutting the so-called rotary veneer, a log is mounted between the centers of a huge lathe and is revolved against the knife and a nosebar. The effect is quite odd to the novice, as the log is seemingly unrolled into a long, continuous sheet of veneer. As the log revolves, the knife is fed inward at a rate that holds the thickness of the veneer uniform.

To make the veneer lie flat, the surface of the log is slightly compressed by the nosebar, which rides upon the log just a trifle in advance of the cutting edge of the knife. Both the nosebar and the cutting edge of the knife must be accurately true and closely set, relatively, before good veneer can be produced.

Veneer knives are of different lengths, some of the longest being close to 200 in. When the length of the knife is considered in conjunction with the accuracy of its setting, it will be understood why the grinding must be done with care. Previous practice was to use a straight wheel, but today cup and sectional wheels are favored. The wheels should be of from medium to soft grade and of a bond that will allow good dressing action. In the old days, constant watching was necessary in grinding, but is no longer necessary.

The bevel of a veneer knife must be ground slightly concave for best results, since the bevel is next to the log and there must be a certain amount of clearance. Concaving should not be overdone, however, for too much clearance robs the edge of much of its strength and will render it unable to stand the shock when it is struck by a knot.

Because of the relative accuracy with which the knife and the nosebar must be set, it is better practice to grind the back face of the knife lightly and periodically as well as to grind the bevel. As the bevel is next to the log, the veneer flows between the nosebar and the back face of the knife. The knife projects considerably from the device in which it is held, and the continual flow of the veneer over it wears the back face somewhat but not uniformly. Therefore, regardless of the precision with which the bevel is ground, an accurately-true cutting edge does not necessarily follow unless the back face is also ground.

Where it is necessary to control the amount of concavity in the bevel, the use of the cup wheel, whether solid or sectional, is of especial value because the amount of concavity can be varied by setting the wheel at different angles to the knife. With a straight wheel the concavity is equal to the radius of the wheel, and the smaller the wheel becomes, the greater is the concavity.

Copper and Abrasives

HAROLD L. WYNN
Executive Engineer,
Pacific Electric Manufacturing Corporation

In electrical manufacturing, copper is one of the essentials that cannot successfully be dispensed with. This metal has many peculiarities. The one that seems to give endless concern is its inherent cutting permanency in the presence of certain abrasives, notably some of the manufactured ones. The minute crystals imbed themselves into the relatively soft copper and create an abrasive action, even in the face of careful wiping and rubbing. This is true even after it appears to the naked eye that every particle has been removed. Those who have used artificial abrasives to grind in switch blades have found to their amazemen that cutting action continues in spite of every precaution.

After experimenting with many abrasives I have found that the only one that will not carry with it permanent scoring is powdered glass. This abrasive, when carefully wiped off, will not continue to produce the disastrous effects as is the case with abrasives of other types. Powdered glass can be obtained commercially in many grades of fineness, and the selection of the grade to use depends principally upon its application. Naturally, the finer it is the slower will be its action. To obtain the best results it should be mixed with ordinary lubricating oil in the same manner as with any other abrasive. Powdered glass can also be used in all kinds of lapping, especially where the surfaces are of a bearing nature and require that avoidable wear be kept to the minimum.

How Much Finish on Fixtures?

Psychology plays its part in the shop as well as in other walks of life. Small drill jigs are frequently finished all over. Large fixtures are usually left rough with little or no finish beyond the locating surfaces and perhaps the bushings for drills or boring bars. Other shops paint fixtures to match the machines or to give distinguishing colors for different products. Some contend that where fixtures are not given at least a semblance of finish they receive less consideration from the men using them which may easily result in a higher cost of upkeep. On the other hand, the practice of finishing jigs all over usually adds unnecessarily to their cost.

Polishing the heads or ends of bushings and a few parts that easily lend themselves to finish is suggested as a compromise. A coat of paint also helps to add to their appearance and costs little. As in many other phases of management compromise costs little and tends to add to the care with which the fixtures are handled. This, of course, refers to fixtures of medium or large size. On small work it frequently costs no more to finish it all over.

Specifications for Men Discussion

JAMES MCINTOSH

Referring to John R. Godfrey's remarks on specifications for men (*AM*—Vol. 78, page 651), I have had experience with the value of a proper training as it applies to industry. This experience includes the kind of help found in a rural town and that found in a large industrial area. My work consisted of devising ways and means to utilize farmer boys with no previous training.

Proper jigs and tools were designed so that there was no experience necessary to locate and fasten definitely and accurately even the most complex piece on a machine. The speeds and feeds decided the quality and quantity, and the ambition of an operator was the gage of his progress. This led a large automobile company to abandon its city and move even its general offices to a small city where efficient operation was a demonstrated fact. As a result I was invited to leave this efficient plant to duplicate the results in a plant in a large city. The result due to industrial center training was so obviously bad that a change was absolutely necessary. This scrap factory was later put on the map and made into an efficient plant.

IDEAS

FROM • PRACTICAL • MEN

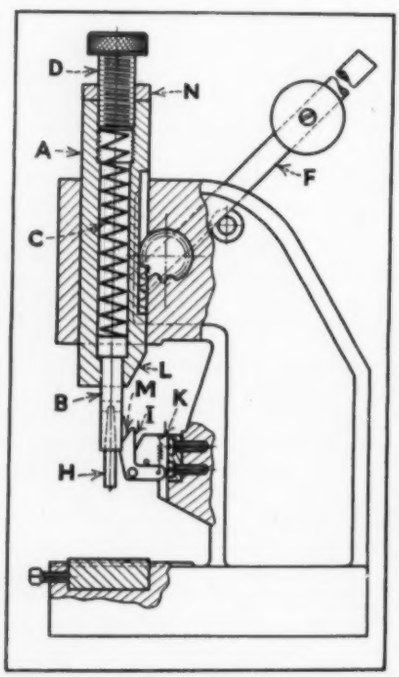
Staking Press Having an Adjustable Blow

JOHN A. HONEGGER

Staking plays an important part in the manufacture of many specialties. It is essential, however, that a blow of varying force can be applied, for it often happens that a harder blow is required for deforming one material than for another, or the assembly parts may be of fragile materials, which if struck too hard might cause them to crack. All these factors entered into the staking operations for some specialties the writer had to assemble, and to obtain all possible flexibility in the staking device, the press illustrated was designed.

In general construction the press follows the outlines of the conventional arbor press. The quill *A* is bored to receive the plunger *B*, the helical spring *C* and is threaded for the adjusting screw *D*. It is operated by the lever *F* through a pinion and a rack. The staking punch *H* fits the taper hole in the plunger. Attached by a bracket on the upright of the press is the pivoted latch *I*, which is normally held in the position shown by the pull spring *K*, a notch in the apex of its angular surfaces being just under the lower end of the plunger.

In operation, when the quill is lowered, the latch prevents the plunger from coming down with it and consequently the spring in the quill is compressed. Continued downward movement of the quill further compresses the spring. When the quill has been lowered far enough for its angular surface *L* to contact the angular surface *M* of the latch, further downward movement pushes the latch inward and releases it from the plunger. At this time the plunger is forced down sharply by the spring in the quill, carrying the staking punch with it to deliver a blow on the work. The force of the blow can be varied by screwing the adjusting screw in or out, increasing or decreasing the initial tension of the spring. The adjusting screw is locked by the nut *N* after adjustment has been made. A record of screw adjustments can be kept for various materials.



The force of the blow can be varied by screwing the adjusting screw in or out, thus increasing or decreasing the tension of the spring

Stripping Devices

WM. C. BETZ

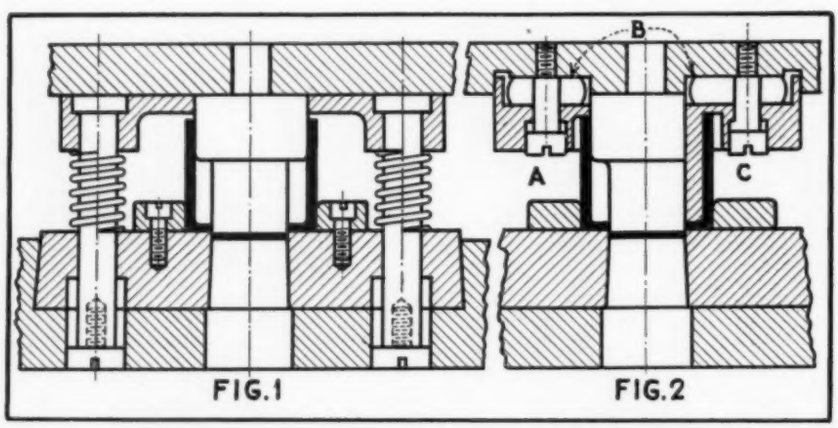
Equipment Engineer, Fafnir Bearing Co.

Where the bottoms of deep cups are to be pierced, it sometimes happens that the shut height of the press does not allow for sufficient length of the punch and yet permit enough clearance under the stripper to place and remove the work.

A stripper that overcomes this difficulty is illustrated in Fig. 1. It consists of two pillars that are free to travel up and down in the die-block, a stripper plate attached to the tops of the pillars, and helical tension springs on the pillars between the stripper plate and the die face to carry up the stripper plate as the ram makes its ascent.

Another stripper for use under the same conditions is illustrated at *A* in Fig. 2. Here the stripper plate is attached to the punch plate by shoulder screws, the counterbores for the heads being deep enough to permit the stripper plate to slide on the bodies of the screws for a short distance. Tension is applied by the rubber ring *B*, which is interposed between the stripper plate and the punch plate. The diameter of the hole in the rubber ring should be at least ⅛ in. larger than the bodies of the screws, and its outer diameter should be a like amount smaller than the recess in the stripper plate to permit the rubber to flow as it is compressed.

If it is necessary to pierce the cups before the tops were trimmed, or if there is danger of distortion in applying stripping pressure at their tops, the stripper can be made as at *C*. Stripping pressure is then applied at the bottoms of the cups.



These strippers are for use in presses in which the shut height is too little for punches long enough to pierce the work and yet allow clearance enough under the stripper to place and remove the work

A Special Anvil for the Micrometer

H. C. SEEGERS

For measuring the width of very thin hardened and ground stock, we formerly used a micrometer having an anvil shaped as at *A*, Fig. 1. The upright *B* serves as a support to keep the stock vertical. The contact surface of the anvil is at *C*. When an anvil of this type becomes worn in a groove from constant use, it is a very difficult matter to relap it, due to interference of the upright with the lap.

To obviate the difficulty of lapping, we made the anvil without an upright, as at *D*, the front being beveled at *F* for thumb clearance. As a guide or support for the stock, we put a short piece of tubing *H* over the anvil and attached it thereto by a small setscrew. The tubing is beveled at *I* to expose the contact surface of the anvil and is cut away at *K* an amount determined by the thickness of the stock to be checked.

If the anvil becomes worn in any one spot from constant use, the setscrew is loosened and the tubing is rotated a few degrees. This permits the stock to span the worn part and contact an unworn part of the surface. If the anvil becomes worn enough to need re-lapping, the tubing is removed and there is nothing to interfere with the lap. In lapping the anvil, we put a collar on the spindle of the micrometer, as at *A*, Fig. 2, to serve as a guide for the lap *B*, which is given an oscillatory movement.

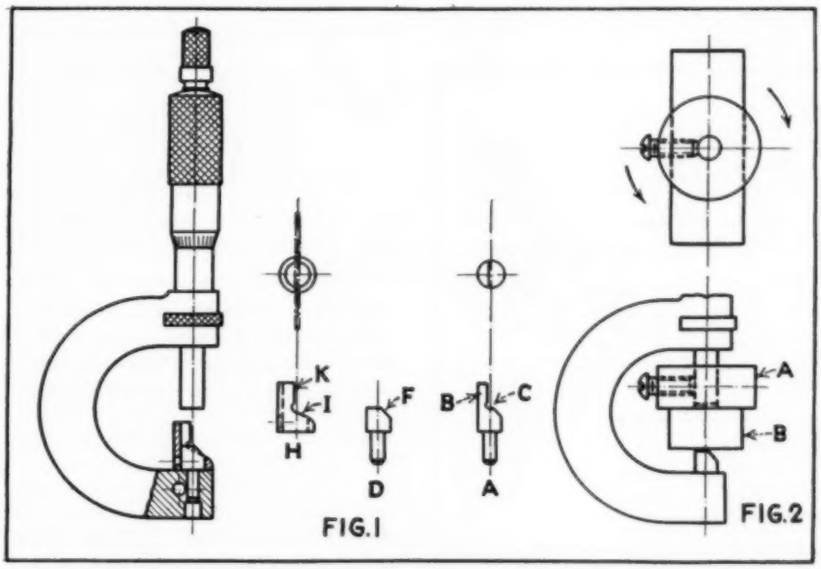
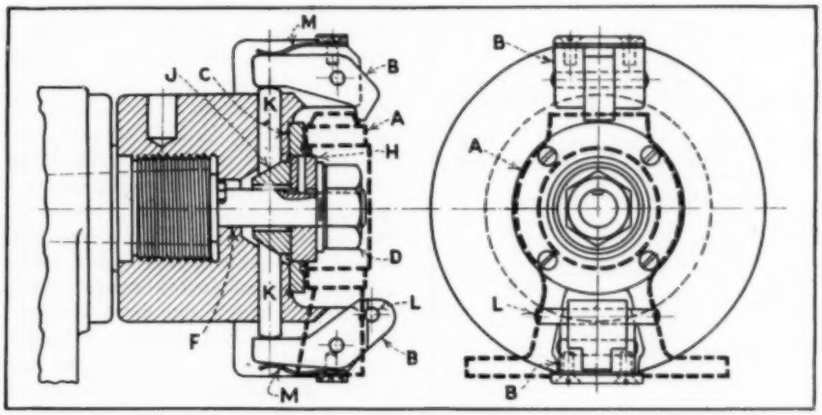


Fig. 1—The old and the new type of anvil for measuring the width of very thin stock. Fig. 2—For lapping the anvil, the collar on the spindle serves as a guide for the lap

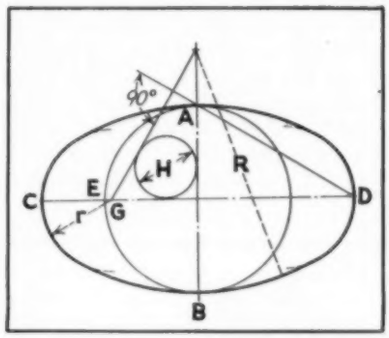


The pivoted clamping jaws are operated by pins actuated by a floating cone. When the clamping nut is tightened, the work is forced against a hardened seat in the chuck

Patternmaker's Oval

J. I. HOMMEL

To construct what is known as the patternmakers' oval having a height *AB* and a length *CD*, draw a circle having a diameter *AB*. Draw the circle *H* having a diameter equal to the distance *CE* and tangent to the lines *AB* and *CD*. Draw line *AD* and draw line *FG* perpendicular to line *AD* and tangent to circle *H*. Point *F* is the center for radius *R* and point *G* is the center for radius *r*.



The oval can easily be drawn in any proportion of height to length desired by following the directions

Chuck for Facing Compressor Bodies

J. DECKER

The chuck illustrated was designed for facing the bodies of small compressors, such as the one shown at *A*. The chuck body is slotted to receive the two clamping jaws *B*, which force the work against the hardened seat *C* by tightening nut *D* on the central bolt *F*. Tightening the nut transmits axial movement to washer *H* and cone *J*, causing pins *K* to move radially into contact with the heels of the pivoted clamping jaws.

Bolt *F* is keyed to the chuck body, and washer *H* is keyed to the bolt, so that neither can rotate. Cone *J* is keyed to the washer by a radial key. Since the cone is bored larger than the diameter of the bolt, it can float, but in the direction of the radial key only, equalizing the pressure on pins *K* and compensating for variations in the work at the clamping points.

One of the pivoted clamping jaws is provided with a loose pin at *L*, which, due to the shape of the work, must be removed when loading or unloading the chuck. When nut *D* is backed off, clamping pressure is released and the flat springs *M* withdraw the clamping jaws from the work.

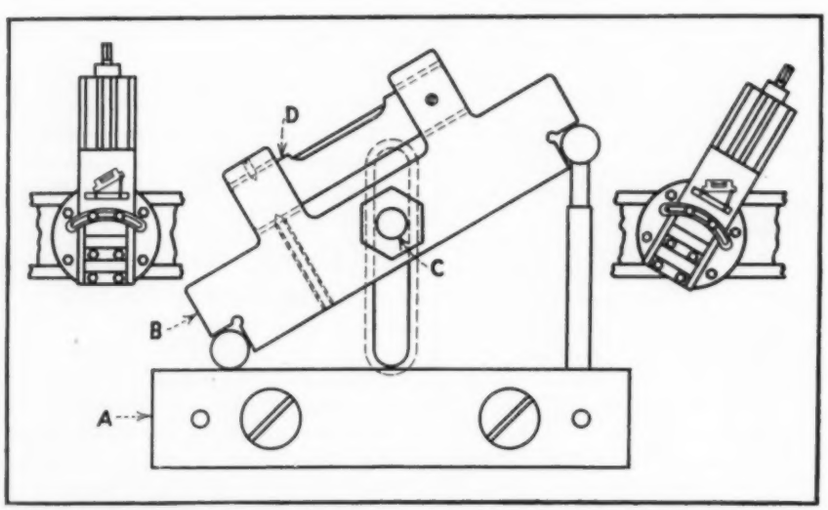
Setting Planer Heads to Angles

WALTER S. KLAY

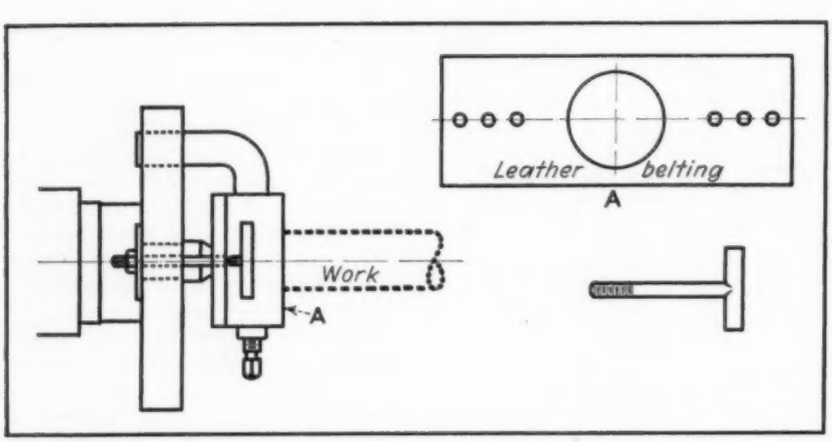
Planer heads can be accurately set to predetermined angles by use of the combination sine bar and spirit level illustrated. It goes without saying that for accurate setting the planer table and the crossrail must be parallel and the travel of the down feed slide must be at right angles to both the crossrail and the planer table.

Referring to the illustration, the block *A* is screwed and doweled to the down feed slide at a right angle to its travel and serves as a ledge or support for the sine bar *B*. The vertical T-slot extending upward from block *A* must either be milled in the slide or be carried in an extension of the block *A* itself. This T-slot carries the clamping bolt *C* for the sine bar. The mounting for the spirit level *D* is integral with the sine bar and is provided with screws for adjusting the level glass in horizontal and vertical alignment with the disks on the sine bar.

To set the head to a predetermined angle, the sine bar is placed on block *A* with the clamping bolt through the hole in its center. Gage blocks equal to the sine of the required angle multiplied by the length of the sine bar are placed under one of the sine bar disks and the sine bar is clamped in position by bolt *C*. After removing the gage blocks, the head is swiveled until the level bubble is in the center of the glass. The head is now set to the required angle. The swivel head is then clamped and the planing operation performed; the accuracy obtained depends on the planer bed being level, and the cross rail parallel with the table.



By the use of the combination sine bar and spirit level, the planer head can be accurately set to plane a predetermined angle



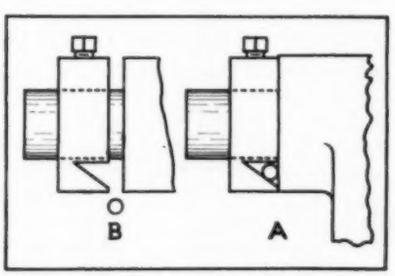
The leather strap is slipped over the work and against the lathe dog and is then pulled toward the faceplate by T-bolts, holding the work tightly against the live center

Counterbore Stop Gage

H. MOORE
Hamilton, Ontario, Canada

For shallow counterboring in the lathe, the stop gage illustrated is very accurate. It is simply a square block bored to fit the outside of the tailstock spindle, tapped for a setscrew and having an angular groove in one side; and a rod turned to a diameter equal to the depth to be counterbored.

In use, with the counterbore just touching the work and the stop gage against the nose of the tailstock, the rod is put in the angular groove, as at *A*. Counterboring is started and is continued until the rod falls out between the block and the nose of the tailstock, as at *B*, at which time the counterbore has reached the required depth.



The diameter of the rod in the angular groove is equal to the depth to be counterbored. When the correct depth has been reached the rod falls out

A Convenient Strap for Steadyrest Work

PETER L. BUDWITZ

A handy strap for holding steadyrested work against the live center is shown in the illustration. It consists of a piece of leather belting and two T-head bolts.

The leather strap *A* has a hole in the center by which it is slipped over the work and a series of smaller holes for the T-bolts. With the leather strap over the work and against the lathe dog, as shown, the T-bolts are put through the small holes in the strap and through the slots in the faceplate. The T-bolts are drawn back by nuts at the rear of the faceplate, drawing the strap tightly around the dog and pulling it back so that the work is held against the live center. Such a device is more dependable than tying the dog to the faceplate in the usual way.

One-Operation Press Tools for Piercing, Blanking and Forming

C. W. HINMAN
Scripto Manufacturing Company

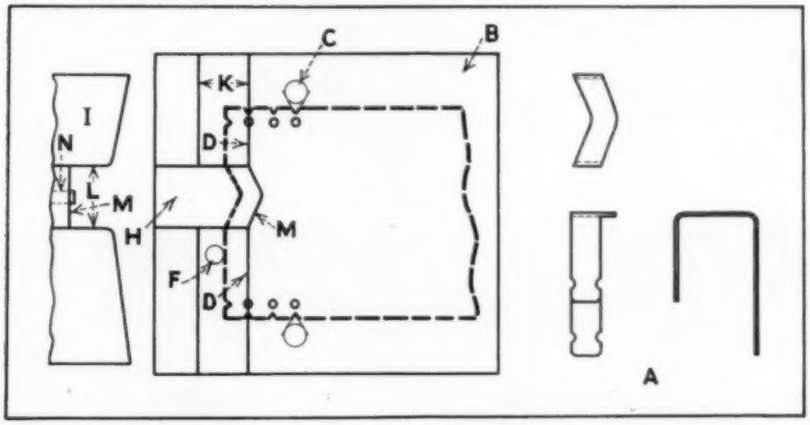
The press tools illustrated are for piercing, blanking and forming the double-end terminals *A*, which are used in telephone central-office equipment. They are made from 0.020-in. soft, tinned brass in rolls 2-¼ in. wide.

The die-block *B* is covered by an open-channel stripper plate, not shown. At the first station *C* two ⅛-in. holes are pierced and the corners of the stock are clipped by punches that have backing-up heels. The next progressive station is idle, providing sufficient metal to support the shearing edges *D* of the die. The stock is then advanced to the stop pin *F* by a roll feed.

Below the strip stock at the left is the pressure pad *H*, the springs of which are stiff enough to resist the pressure necessary to form the work. When the combined shearing, forming and cutting-off punch *I* descends into the close-fitting slot *K*, the terminal arms are sheared from the strip by the angular shearing edges. Continuing its descent, the punch completely forms the work over the pressure pad and within the punch opening *L*. Further descent of the punch depresses the pressure pad and the piece is severed from the strip by the edges *M*. When the punch ascends, the pressure pad follows it until it is flush with the die-block.

The work is carried up within the punch opening *L* and is ejected when the knockout rod *N* contacts a bar within the press head. The finished piece is blown into a convenient chute by an air jet, preventing it from falling back onto the die, and is delivered into a pan at the rear.

The die set and the leader pins have been omitted from the illustration for the sake of clarity. The press runs continuously and completes a piece at each stroke. 6,000 pieces per hr. is the usual production.



Shearing the piece from the strip is done in two stages but at the same stroke. The finished piece is carried up by the punch and is blown into a chute by an air jet

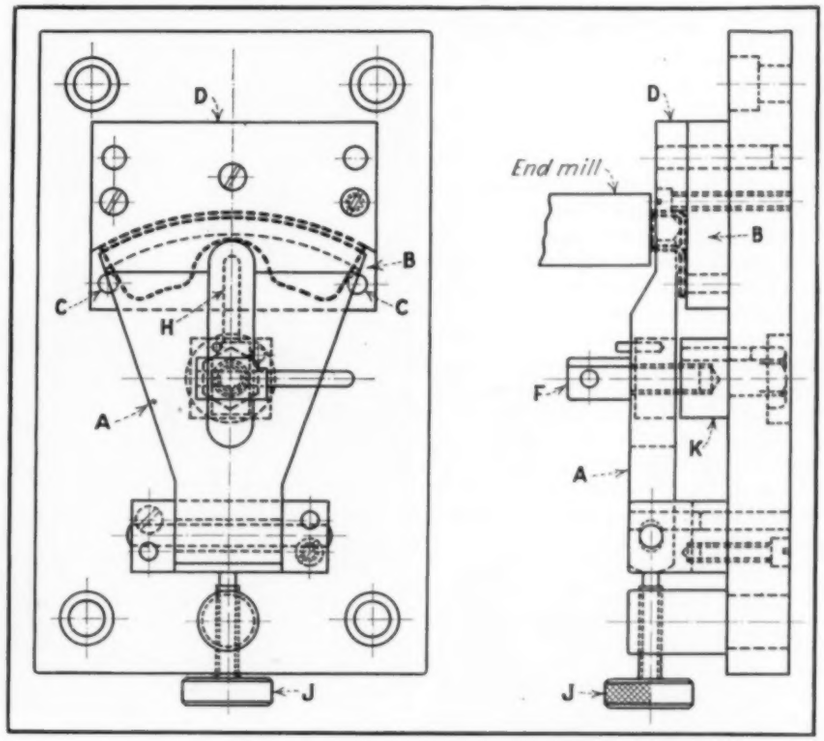
Fixture With Two-Way Clamp

C. COLE

The fixture illustrated is for milling the top edge of the formed punching indicated in heavy dotted lines, the work being done by an end mill in a vertical milling machine.

Clamping pressure is exerted on the work in two directions by the hinged clamp *A*, the work resting on block *B* between the two pins *C* and against the stop block *D*. When the fixture is being loaded or unloaded, the clamping screw *F* is slid back to the position shown, slots in the base and in the clamp being provided for that purpose. A hole in the clamp permits it to clear the head of the clamping screw as it is swung up or down on its hinge.

With the work in place, the clamp is swung down and the clamping screw is moved forward into position *H*. Pressure of the clamp on the work is in two directions; downward by the clamping screw and forward by the screw *J*, the hinge hole in the clamp being elongated to permit the forward movement. The post *K* helps to align the clamp and also serves as a nut for the clamping screw.



Pressure on the work is in two directions; downward by the clamping screw and forward by screw *J*. An elongated hole in the hinge pin end permits forward movement

SHOP EQUIPMENT NEWS

Keller BG-3 Automatic Die-Sinking Machine

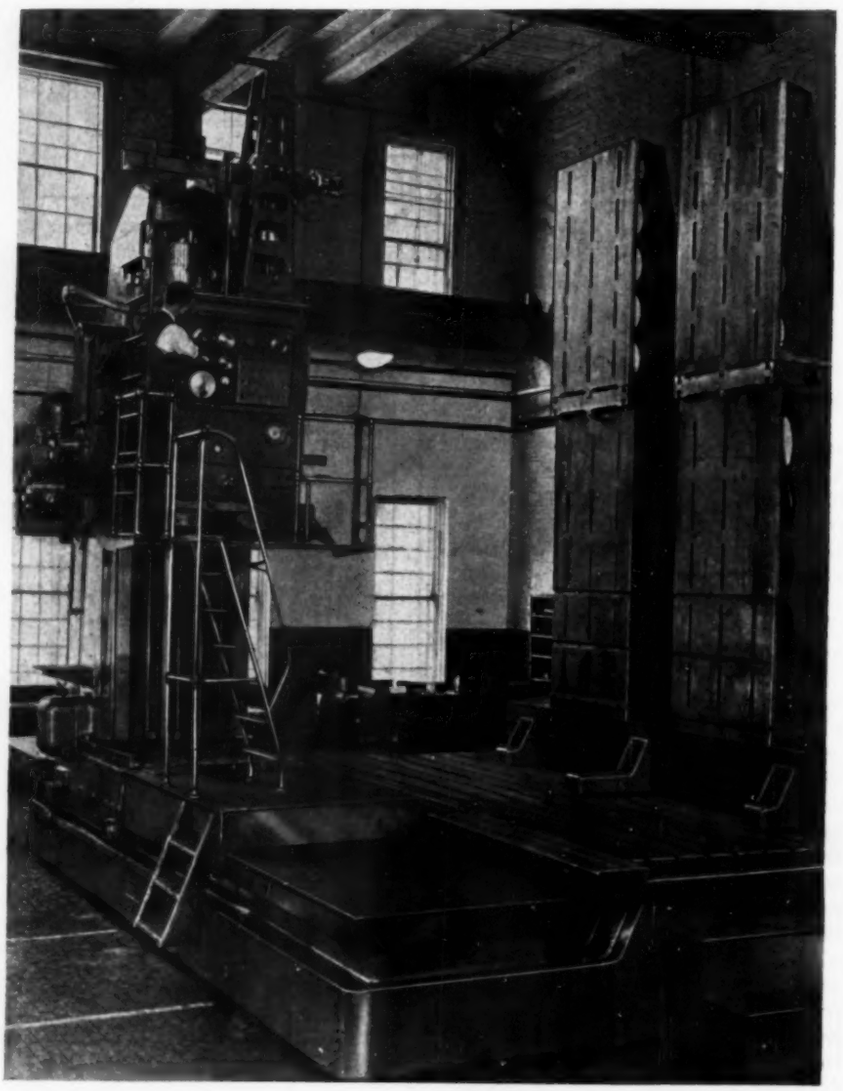
As a result of changes in automobile bodies and the subsequent necessity for large dies, the Keller Division of the Pratt & Whitney Co., Hartford, Conn., has developed the BG-3 machine, designed to cut an impression 12 ft. long by 6 ft. high by 30 in. deep without resetting of the die block. The machine is 32 ft. 5 in. long, 19 ft. 3 in. wide, 21 ft. 1 in. high and weighs 154,000 lb. Its function is the reproduction of dies, punches and welding fixtures from a master or model with a high degree of accuracy.

The BG-3 machine, like previous Keller automatics, is operated by a simple electrical control through which the shape of a model is reproduced automatically. It may be used for two-dimension work, as in profiling, or for three-dimension cutting of solid forms. In either type of operation an electric tracer, mounted on a bracket over the milling cutter, passes over a master form bolted above the work on the fixture-upright, and the cutter duplicates the tracer path precisely. The tracer controls a series of magnetic clutches which actuate the various motions of the machine. These motions are: horizontal movement of the column on the bed, vertical travel of the saddle and transverse movement of the entire head on the saddle. In addition, the machine has a spindle adjustment of 9 in. to and from the work.

For this machine two interchangeable spline-driven spindles are furnished. They are identical except for length, the longer one having a maximum extension of 34 in., and the shorter 10 in. from the head, and they permit the full use of the traverse travel of the machine in the production of dies of different depths. They are 5¾ in. in diameter, mounted in roller bearings and carried in 10 in. sleeves. Drive keys facilitate the use with face mills. The spindle is driven by a 10 hp. adjustable-speed motor mounted vertically on the gearbox. Speed changes range from 10 to 800 r.p.m., obtainable by means of three levers, without pick-off gears. All gears are lubricated constantly by means of a pump and piping within the gear box.

Horizontal and vertical travel of the head ranges from 1½ to 100 in. per min. The machine is arranged with the operating platform attached to the saddle. The operator, riding on the platform, has means for every adjustment at all times conveniently at hand.

The arrangement for driving the horizontal and vertical motions of the machine is an outstanding feature, the



The three knobs on the upper level of the control panel permit the operator to secure the complete range of spindle motor speeds, horizontal, vertical and traverse feed and rapid traverse

drive for both being through a magnetic gearbox on the rear of the column. This box contains two banks of magnetic clutches, four clutches to the bank. The upper four clutches are driven continuously by an adjustable-speed motor, and the operator, from his platform can energize any one of them and thereby select the clutch that will drive the lower bank. Two clutches in the lower bank drive the horizontal motion of the machine, and the other two drive the vertical motion. The magnets can be energized by pushbuttons or automatically under tracer control. Traverse motion of the spindle head is effected through a similar magnetic gearbox driven by an adjustable-speed motor, with speeds ranging from 3 to 36 in. per min. The vertical leadscrew of the machine is driven from the magnetic gearbox through a shaft bevel gear. Another shaft from the gearbox drives a rotating nut for the horizontal movement. This stationary leadscrew is 3½ in. in diameter.

The boxes from top to bottom show, respectively, the motor starters, the low voltage dynamotor for the control circuit current and the magnetic drive gear

As the motion of the machine is at times practically imperceptible, two indicators have been provided to show the operator the direction and speed of the horizontal and vertical motions. All bearing surfaces are oiled by an automatic force-feed system, the pump of which is controlled magnetically by a contactor cam that is geared to the slide.

Counterweighting of the head is by means of a 12,000 lb. weight, inclosed in the column and connected to the head by two roller chains. Supplementing the chains, as an extra safeguard, a very coarse pitch screw runs vertically through the counterweight and is driven by the vertical leadscrew. A nut in the counterweight just clears the screw at all times, but should the chain break, the weight would settle on the safety screw before the weight could fall far enough to cause damage.

Chip disposal is by means of a motor-driven screw conveyor in a trough located between the bed and the table of the machine. The chips are moved constantly toward one end of the bed, where they are dropped onto another conveyor and deposited into a large receptacle. By means of vertical and transverse slides the tracer can be raised and lowered 32 in., and can also be moved in and out for the same amount.

Bearing Housing Closures

Closures for approximately 150 sizes of ball and tapered-roller bearings are anounced by the Bearing Appliance Co., Ardmore, Pa. Bolt fastening dimensions have been established, and for each group of bearings having similar diameters a number of parts, all having identically located holes, are provided. Covers carrying felts, covers with flingers and covers for the accommodation of standard leather or composition oil seals are included. Numerous shaft extension sizes can be utilized, and the varying degrees of inside space offered permits mounting bearings with or without locknuts, in fixed or floating positions and with proper abutting shoulder diameters.

Lincoln 100-Amp. Welder

A small motor-generator type of arc-welder is announced by The Lincoln Electric Co., 13010 Coit St., Cleveland, Ohio. Known as the SA-100, this unit delivers as low as 30 amp. at the arc without the use of auxiliary devices. The generator is of the single-operator, variable-voltage type with 100 amp. rating. Dual control provides independent adjustment of open-circuit voltage and welding current. The motor installed is the "Linc-Weld" 5-hp. squirrel-cage induction type for

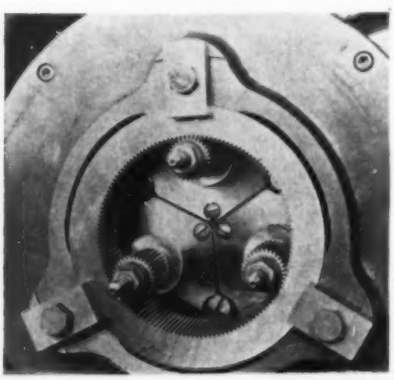
across-the-line starting. Wing-nut cable terminals permit easy change of the welding current polarity. The welder normally operates on 220 or 440 volts and can be furnished for 110 or 550 volts, 2 or 3 phase, 60 and 50 cycles. The unit is 20 in. long, 50 in. wide, and 40 in. high.

Fellows Planetary-Type Gear Lapping Machine

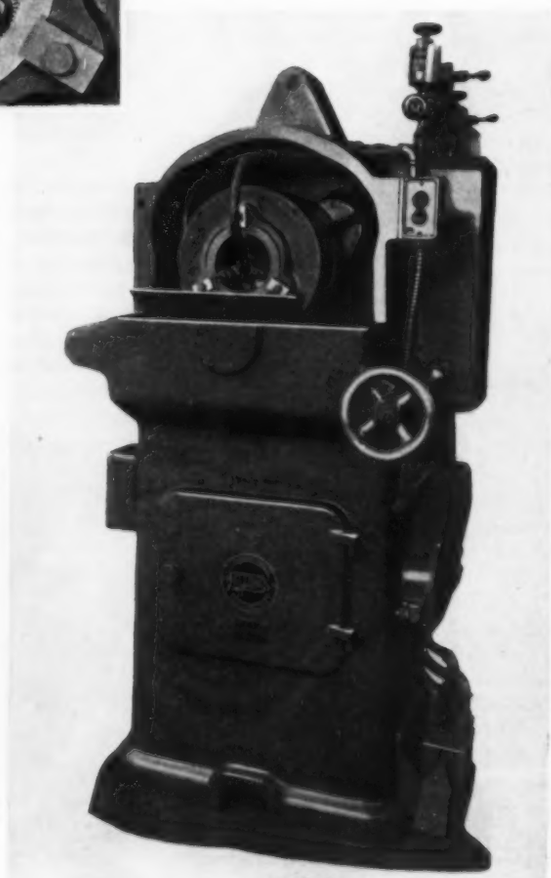
The Fellows Gear Shaper Co., Springfield, Vermont, has placed on the market a planetary-type gear lapping machine particularly adapted to the lapping of small fine-pitch gears. On this machine the lap, which is of the internal-gear type, is held stationary. Attached to the work-spindle of the machine is a self-contained planetary-type head, carrying three supplementary work-spindles, in which arbors are retained for holding the work.

The planetary head is rotated by the main work-spindle end, as it rotates, carries the three work-holding spindles with it. Each spindle has a pinion attached to it and three mesh with the individual internal gears, which are arranged to offer resistance to the free rotation of the work. The planetary head, in addition to being rotated, is also reciprocated. This rotative motion distributes the lapping compound, and the reciprocating action accomplishes the lapping. The three work arbors each carry six gears. These gears are heat-treated before cutting and are brought directly from the gear shaper to the lapping machine without removing them from the arbors. Actual lapping time does not exceed ½ min. for 18 gears.

To facilitate operation of the machine, an air ejector for the work arbors is provided. The air cylinder is attached to the rear of the machine work-spindle, and is operated by a treadle. Gears of different diameters are lapped by using internal-gear laps made to suit the diameter of the gears and the center distance of the three lap spindles. This method can be adapted to the lapping of both spur and helical external gears.



Work arbors and internal-type lap may be adapted to the lapping of both spur and helical external gears



Fellows gear lapping machine, with planetary-type head set up for lapping small gears which are 0.75 module, 30 teeth and 0.235 in. face

"Kelsanite" Rubber Protective Coating

Kelsan Products, St. Clair, Mich., has developed a process which makes possible the use of rubber protective coatings applied in liquid form. One manufacturer has been experimenting with the possibility of coating a complete automobile body with "Kelsanite" as it comes out of the paint shop, leaving it on while the body goes over the final assembly line. An important application of "Kelsanite" is in the protection of finished parts and equipment for shipment or storage. Parts can be sprayed or brushed with, or dipped in Kelsanite, thereby sealing the surface against air and moisture. As a rust preventor in storage of metal parts, Kelsanite coated parts have been subjected to over 150 hr. salt-spray tests without showing any signs

of corrosion. In the plating of metal parts, Kelsanite may be used as a masking compound to prevent deposition of metal except where desired. Following the plating operation, the coating is readily stripped off.

"Spra-Bonderizing" Rust-Proofing Process

Supplementing the immersion "Bonderizing" process, the Parker Rust-Proof Co., Detroit, Mich., announces another method of application, "Spra - Bonderizing." This process chemically produces a rust-resistant phosphate coating that provides an adherent base for paint, enamel or lacquer. It is accomplished by spraying the processing solution on to the product. Spra-Bonderizing makes possible the production of phosphate coatings at lower temperatures and lower chemical concentration than has been possible by an immersion process. The pressure spraying accelerates the chemical reaction and produces both a cleansing and coating action in one operation. Processing time has been reduced to 60 sec. as against 2 to 5 min. by the immersion process.

Sheffield Visual Gages

The No. 1 "Visual Gage," Fig. 1, produced by the Sheffield Gage Corp., Dayton, Ohio, is both a rapid inspection gage for close-tollerance production work and also a precision comparator by which fine work-shop gages may be checked periodically. A relative movement of 0.000025 in. between the anvils covers a space of ⅛ in. or one unit on the illuminated dial. This 5,000 to 1 magnification results from obtaining mechanical and optical magnification, without resorting to any movable elements such as gears, pinions, levers or knife edges.

The heart of the gage consists of four flat reeds, so arranged that when a part is inserted between the anvils, one set of reeds is put in compression and the other set in tension. Movement resulting from the equalization of these stresses causes the pointer to move across the reading scale. A diamond tipped upper gaging element minimizes all effects of wear. The lower anvil is furnished in two interchangeable types, one flat for the gaging of flat surfaces and outside cylindrical diameters; the other, of a mandrel type, for gaging internal diameters. When the gage is to be used for high production inspection, a strip of tungsten carbide ½ in. wide is set in the flat surface of the anvil as an additional protection against wear. The mandrel anvil for internal diameter gaging carries two strips of tungsten carbide properly spaced. These are set solidly in the mandrel with their surfaces slightly above its outside circumference. A lower contact consisting of a spherical tungsten carbide point is set in the end of a lever which actuates the diamond pointed upper gaging element. Thus all internal diameters are measured on a 3-point contact.

The gage head carrying the reed mechanism is readily moved up and down on a large diameter standard. Maximum travel is 6 in. A master measuring element is placed between the lower anvil and the gaging element, as a means of setting the gage. The gaging element is brought approximately in position with a large thumb screw at the right of the column. Final adjustment is then completed by moving the knurled nut on the spindle just above the diamond-tipped gaging element.

The visual gage can be used on any 110 volt a.c., 60 cycle current. A transformer is mounted in the base of the gage for stepping down the voltage to 8 volts. This current is used only for illuminating the reading dial.

The No. 3 Visual Gage, Fig. 2, differs from the No. 1 in that it operates on a 1,000 to 1 magnification. A relative movement of 0.0001 in. between the gaging elements registers a distance of ⅛ in. on the illuminated dial. Both gages utilize the reed mechanism.

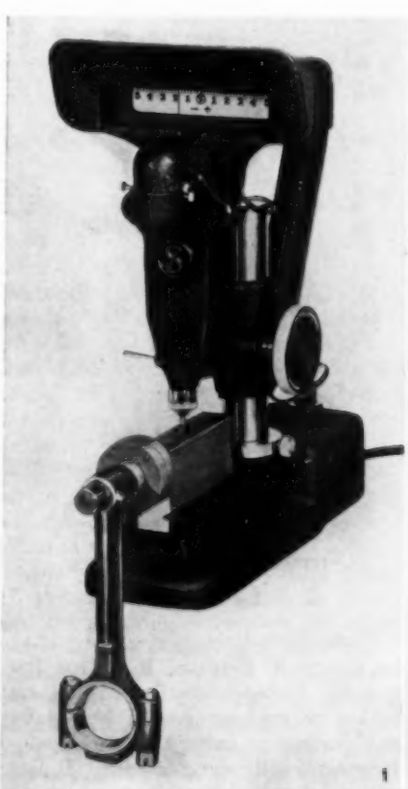


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Fig. 1—No. 1 Visual Gage checking the small end of a connecting rod by means of the internal attachment. Fig. 2—No. 3 Visual Gage, which operates on a 1000 to 1 magnification, checking a production gage block

Alemite High-Pressure Barrel Pump

The Alemite high pressure, air-operated barrel pump, introduced by the Stewart-Warner Corp., 1826 Diversey Parkway, Chicago, Ill., converts any 100 lb. lubricant container into a power gun for industrial lubrication. Utilizing a Nitralloy piston, a low-pressure pump carries a continuous flow of lubricant from the container to a high-pressure pump. From there the lubricant is delivered at the rate of 18 oz. per min., or 6½ oz. of extremely fibrous and heavy lubricants. High pressure, 33 times the air pressure used, is available to furnish a delivery sufficient to take care of several outlets at one time.

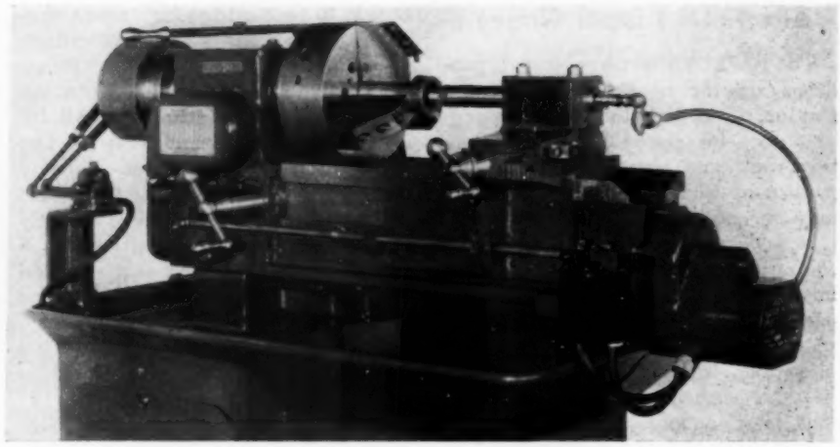
Removal of the pump's top cover, held in place with one bolt, gives access to all working parts of the double-action air motor. Cleaning of the check valve is accomplished without detaching the hose from the gun.

Quick-Return For Porter-Cable Carbo-Lathe

The Porter-Cable Machine Co., 100 Wolf St., Syracuse, N. Y., has developed an electric quick-return for the carriage, also the facing attachment, of its Carbo-Lathe. It consists of a separate electric motor attachment which is fastened to the end of the lathe bed by four capscrews and two dowels. It is connected to the feed shaft running through the center of the lathe bed by a flexible coupling. Power is supplied by a ½-hp. motor with special torque winding which is capable of 300 per cent overload. This motor is regularly furnished for 220 volts, 60 cycle, 3 phase. Motors for 440 or 550 volts, two phase, can be furnished. A spring-loaded disk clutch is built into the gear drive, which is adjustable so that it will just drive the carriages, but if the power feed of the table is engaged, and the motor is started, the clutch will slip, thus protecting the motor and feed mechanism. The switch regularly furnished with this attachment is a reversing drum-type, manually-operated with spring neutral.

Ransom No. 101 Pedestal Grinder

The Ransom Grinding Machine Co., Oshkosh, Wis., is introducing a grinder which is intended for using up stub wheels. After wheels have been worn down to approximately 7 in. in diameter, they are transferred to this machine for further use. The 3 hp. motor is suitable for 3-phase, 60 cycles, and either 220 or 440 volts at 3,600 r.p.m. Distance between wheels is 42 in. Diameter of the arbor where the wheels fit is 1½ in., or smaller if desired. Adjustable rests can be provided. The guards have hinged doors and exhaust pipe openings and are adjustable for wear of the wheel. The machine weighs 650 lb.



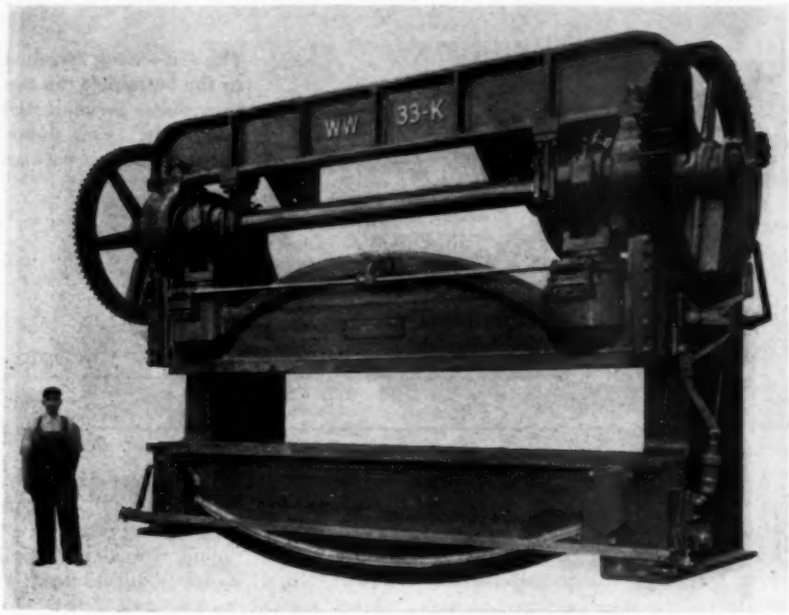
The motor is geared to the jackshaft in the attachment, ratio 2½ to 1

Grob Open-End Bandsaw

To their line of continuous-motion filing machines, the Grob Brothers, West Allis, Wis., have added an "Open-End" bandsaw for internal sawing. A 150 ft. saw band is wound helically over a drum and looped over three guide sheaves, arranged for forward motion at cutting speeds, and reverse motion at high speed. To saw out a die the tension on the saw band is released, the front end of the band, fastened with a self-tightening eccentric clamp to the drum, is removed, the band is inserted through an opening in the die, reconnected to the drum and tension applied. Three minutes of sawing can be done at the lowest cutting speed before the end of the band saw has been reached, at which time the machine will automatically stop. Only 18 seconds is required for the return of the band to its original position. Fastened to the base of the machine are: a box-arm casting carrying a loader sheave and two saw guide sheaves; a support bracket on which the table and a third saw guide sheave are mounted, and two bearing brackets supporting the drum. The drum is mounted on a threaded spindle so that when revolving it screws itself back and forth, winding and unwinding the band. Tapering of the drum compensates for the saw band being heavier on the tooth side. A small guide wheel covered with a rubberized fabric holds the saw band tight to the drum when the tension of the band is released. All revolving members are made of aluminum. A positive stop is obtained by means of a limit switch and a brake on the drum. The saw bands used are 0.025 in. thick, ⅛, ⅜ or ¼ in. wide and 150 ft. long. Four cutting speeds are available as follows: 50, 75, 100 and 150 ft. per min. Reverse speed is 500 ft. per min. Two motors, a variable speed motor for the forward and a single speed motor for the reverse motion, are mounted in the base. Drive is through multiple V-belts. The sawing table, 24x28 in., tilts in two directions in such a way that the height of the center of the table does not change. The throat of the machine is 25½ in., and material up to 9 in. in height can be sawed. Total weight is 2,000 lb., and over-all height is 74 in.

Sonittep Insulating Cement

Sonittep insulating cement, developed by George F. Pettinos, Inc., 1206 Locust St., Philadelphia, Pa., will adhere to hot or cold surfaces of practically any texture or material without reinforcement with wires or nails. It will withstand temperatures up to 2,000 F. without cracking or peeling off, and is resilient to shock. Applications of this cement include various types of furnaces, ovens and boilers.



Many different operations can be performed on this machine

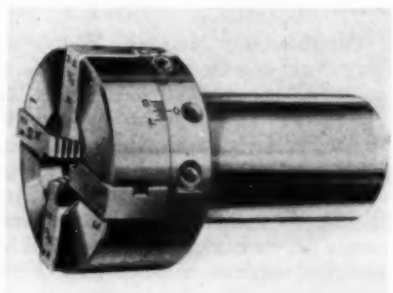
Williams, White No. 33-K Multiple Punch

This No. 33-K multiple punch, manufactured by the Williams, White & Co., Moline, Ill., was built to accommodate many different operations in a shop with widely varied products. Its essential characteristics—long stroke, high die space, long adjustment, and overhanging ram—make it possible to use this machine, with suitably designed dies, as a press brake, a plate shear, or for straight line or group punching operations. With the slide elevated to its uppermost position, the machine will accommodate maximum clearance braking dies that make it possible to perform the same operations on this machine that can be performed on the conventional press brake. With the slide lowered to its lowest position, the machine will accommodate punching and shearing dies of the conventional design without the use of filler bolsters. The barrel-type adjustment used in the construction of this press offers a method to obtain long adjustment in a heavy-duty press of this type. Construction is such that the adjusting screws are not subjected to any other strain than compression at any part of the stroke. Adjustment of the ram is motor-driven, and is of the self-locking type. The press has a capacity of 250 tons. It is equipped with a multiple-grip friction clutch that is engaged by an air-operated treadle and is provided with an automatic stop at top of stroke. A hand engagement of the clutch is also provided for setting dies or for lowering the ram slowly to the work.

Specifications: stroke of slide, 5 in.; adjustment of die space, 8 in.; die space, stroke down, adj. up, 22 in.; distance between housings, 176 in.; length of ram, 184 in.; width of table face, 20 in.; depth of throat, 11 in.; strokes per minute, 25; machine weight, 92,000 lb.

Geometric Style DJ Diehead

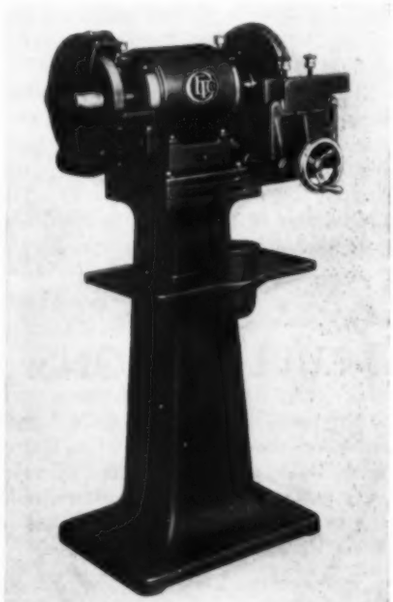
Style DJ solid adjustable diehead, manufactured by the Geometric Tool Co., Blake and Valley Sts., New Haven, Conn., is designed primarily for cutting short threads where the time required for backing off is not important. It has a short over-all length, and its outside diameter is as small as is consistent with proper chaser bearing support. To cut the desired class of fit, to reach the specified pitch diameter, and to adjust the chasers for wear or resharpening, the tool is adjusted to the desired threading size by loosening one screw and tightening another. A cam controls the size adjustment feature. The die is built in sizes from ¼ to 6 in. in diameter. Parts of this tool are made of special alloy steel, hardened and ground.



Cincinnati Cut-Off Machine and Grinder

The Cincinnati Electrical Tool Co., Cincinnati, Ohio, has announced the addition of a combination cut-off machine and grinder to its line of electrical tools. The machine carries a 10x⅛-in. abrasive cut-off wheel on the right side, operating at a peripheral speed of approximately 9,000 s.f.m., and the material to be cut is fed into the wheel by means of a hand screw. Stock is held firmly on both sides of the cut, preventing wheel breakage, and a fully inclosed wheel guard affords protection to the operator. The vise or holding fixture may be tilted to give any angle up to 15 deg. Stock up to 1-in. can be cut in approximately 15 sec.

The left-hand side of the machine is equipped with an 8x1-in. grinding wheel with fully inclosed safety wheel guard, adjustable to the wear of the wheel. An adjustable toolrest is mounted on the wheel guard. The 1-hp. motor is fully inclosed with the rotor shaft mounted on oversize ball bearings in dust-proof housings. A two-pole starting switch is inclosed in the base of the motor.



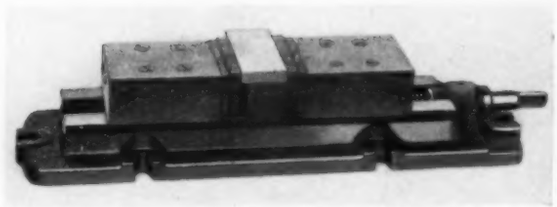
Gier Down-Grip Vise

The C. R. Gier Co., 75 West St., New York, N. Y., is announcing a "Downward-Grip" machine vise, designed to assure accurate seating of the work. While gripping the work, the jaws exert a downward pull and force the work tightly against its seat. It is thus not necessary to hammer the work.

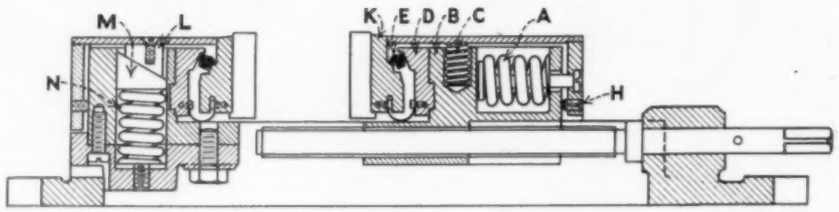
As the screw advances the jaw, the motion is imparted to the outer shell of the vise through the heavy spring *A*. When the work is gripped, further forward motion of the outer shell is prevented. Additional pressure on the screw causes the guide *B* to advance, against the action of the spring, and force the inner formplate *D* to actuate the tilting wedge *E*. The wedge engages the outer formplate *K*, to which the jaw and outer shell are attached, producing the downward action of the jaw. When the pressure is relieved, the vertical pressure spring *C* and the horizontal pressure spring *A* return the jaw to its original position. Downward movement of the jaw may be adjusted by means of the screw *H*.

In the case of the stationary half, the pressure against the jaw presses the outer formplate toward the stationary inner formplate, causing the wedge to force the jaw and outer shell downward. Return to the original position is effected by the heavy vertical spring *N* acting on the bevel bolts *L* and *M*.

This vise is available in 14 models, including either plain or swiveling, with one jaw stationary or both jaws moving, and vise halves, which provide unlimited opening of the jaws. The mcehanism of the vise is inclosed and protected from dirt and chips.



The flat spring attached to the bottom of the two formplates prevents dirt and chips from entering the vise mechanism



• TRADE • PUBLICATIONS

CUTTING TOOLS. Catalog "J," published by the National Tool Co., Cleveland, Ohio, describes its line of hobs, gear cutters, gear shaper cutters, milling cutters and special tools. Illustrations, sizes and prices are included.

INDUSTRIAL TRUCKS. The Elwell-Parker Electric Co., Cleveland, Ohio, has published a booklet, "This New Industrial Pick-Up," describing its pallet system of handling loads on low, slatted wooden trays or pallets. Photographic illustrations show more than 50 operating installations.

INVENTORY CONTROL. The Metropolitan Life Insurance Co., One Madison Ave., New York., N. Y., announces the availability of a report, "Inventory Control Methods," which discusses types of inventory records, reviews various forms of stores ledgers, considers inventory classifications, records for quantity only, records including inventory values, average cost plan, "oldest lot first" plan, and standard cost plan.

MACHINERY. The 400-page "Emerman Red Book" No. 35, published by the Lewis E. Emerman & Co., 1761 Elston Ave., Chicago, Ill., may be used as a reference guide for the purchase of used machine tool equipment. The catalog contains illustrations and specifications of several hundred types and sizes.

METAL STAMPINGS. The Dayton Rogers Manufacturing Co., 1845 East Franklin, Minneapolis, Minn., discusses, in a folder recently gotten out, "A Small Lot Stamping Service Without Prohibitive Die Costs." Blueprints show a few examples of stampings furnished by this company.

MILLING MACHINE. The Index Machinery Corp., Cincinnati, Ohio, announces a 12-page booklet, published by Friedrich Deckel, Munich, Germany, describing the Deckel FP-1 universal tool milling machine, Deckel GK mold milling machine and the Deckel G engraving machine. Illustrations show the application of the machines in the construction of tools, jigs and molds.

PANTOGRAPHIC MILLING. H. P. Preis Engraving Machine Co., 155-157 Summit St., Newark, N. J., announces the publication of a 19-page supplement to the regular 40-page GK Catalog, by Friedrich Deckel, Munich 25, Germany. The supplement "Die and Mould Production," contains photographic reprints of work pieces which show the practical application of the Deckel GK machine.

MOTORS. Allis-Chalmers Mfg. Co., Milwaukee, Wis., has issued two leaflets, No. 2100 describing its line of Type ARY wound rotor induction rotors, No. 2183 describing its Type E direct current motors and generators. Illustrations of the dismantled motors showing details of constructions are included.

PNEUMATIC TOOLS. The Independent Pneumatic Tool Co., 600 West Jackson Blvd., Chicago, Ill., has issued pneumatic tool catalog No. 50, illustrating in its entirety, the pneumatic tools manufactured under the Thor trademark. Specifications are given for rotary tools including drills, screw drivers, right angle nut setters, tapping machines, wrenches, air grinders, cone grinders, and rod grinders.

ROLLER CONVEYOR. Bulletin 41 gotten out by the Logan Co., Louisville, Ky., presents developments in its roller conveyor.

SPRAY EQUIPMENT BOOK. Bulletin AD-114 issued by the Binks Manufacturing Co., 3114 Carroll Ave., Chicago, Ill., gives prices and descriptions of spray guns for finishing, cleaning and oiling; cup-type containers, pressure containers, oil and water extractors, hose, air regulators, nozzles, compressors, potable spray outfits, spray booths and exhaust units.

STEEL PLATES. The Lukens Steel Co., Coatesville, Pa., has compiled a new Size Card which shows the sizes of the rectangular and circular plates it produces. It includes sizes rolled on the 206 in. mill.

WELDING ELECTRODES. The Metal & Thermit Corp., 120 Broadway, New York, N. Y., has issued a booklet presenting its line of Murex welding electrodes. Technical data, principles of design and operation, as well as physical properties and chemical analysis of the deposited metals, are given.

THE ROUND TABLE

Share the Wealth

"Say, Al," said Ed, as he entered the shop office, "what's all this I hear about these 'Share-the-Wealth' plans? Right now I've got less than my share, so if there's going to be any dividing up I want to be in on it."

"That just about rates you as an average victim of the unsound economic propaganda that's floating out over the ether these days. Those who own nothing, join the cry to 'Soak the Rich.' A lot of people have fallen for it, but I thought you had a little better sense."

"I'm open to conviction, Al, but what's the matter with the scheme. These millionaires can only wear one suit and one pair of shoes at a time, the same as you and I. But they have plenty of excess purchasing power. If some of their surplus was in the hands of people who could use it quickly, a lot more goods would be consumed and business would be better."

"Ed, you've been looking at some of those cartoons that picture a millionaire as a dyspeptic old gent seated on a pile of coin. Wealth isn't kept that way—it's put to work producing goods and bringing in an income. Otherwise it would soon be dissipated and divided automatically."

"Give me credit for not being as dumb as all that, Al. I know that money is invested. But how does that affect the principle? Can't invested wealth be divided just as well as cash?"

"Not if we're going ahead industrially as we have in the past. One of our demagogues figured out how much everyone would have if Henry Ford's fortune was divided up among the rest of the population. He attempted to show how much richer we would all be at the expense of one man. But he neglected to take into account that Mr. Ford's fortune is largely in the Ford Motor Company."

"Well, Al, I wouldn't object to an interest in the Ford Motor Company myself."

"That would defeat the scheme to divide wealth and spend it on consumer goods, Ed. Maybe you would be content to become a capitalist, but other recipients would want their cash so they could use it at once."

"And so stimulate business, just as I said."

"Ed, you can't put all or even a great percentage of wealth into consumer channels. A large capital investment is needed to produce consumer goods economically. If it weren't for Ford's plant at River Rouge his cars wouldn't be available at their present price. If good low priced cars could not be bought, thousands of consumers would have their living standards definitely lowered through their inability to own a car. In a very real sense Henry Ford and other industrialists are sharing wealth by giving the average man more than he ever had before."

"But they don't give him the money to buy their products with."

"Yes, Ed, they do that, too. Good wages are now considered to be good business, but the whole structure depends on a soundly financed industry."

Is Ed foolish to listen to the plans of the "Soak-the-Rich" advocates? Is Al right in that wealth is best distributed by efficient production?

Discussion

Change in Design

While it is necessary today to make changes in designs and do anything else to please a customer, I think Al is right when he refuses to make the changes asked for, when he knows they will affect the proper and efficient operation of the compressor.

If he makes the requested changes, Al will not only stand a chance for adverse criticism from engineers who see the compressor, but the customer who ordered it will do plenty of criticizing after the compressor is in operation and he finds that it is not efficient. He will forget or at least will not admit, that it was built, under his specifications, under protest from the builder.

It would be better for Al to lose this one customer than to lose others later on.

— THOMAS M. GARRY,
Foreman-Instructor,
Yale & Towne Apprentice School.

It is a deplorable attitude when the user of a machine thinks he knows more than the builder about its design. In these days of research, most manufacturers endeavor not only to understand the conditions under which their machines operate, but also to anticipate the customer's needs and to see adverse situations.

Because the users of automobiles are usually not acquainted with technical details, that industry has been able to

standardize its products and to sell more cars on the basis of service delivered. Standardization is essential for line production, and customers are beginning to realize that freak designs will largely nullify such advantages.

The customer may be right and the change he wants, an improvement that should be made. On the other hand, no change from standard should be made that might be detrimental to the efficient operation of the machine, as causes for failure are not always apparent. Any departure from standard should be paid for in full by the customer, including higher overhead charges due to extra attention from foremen on down the line. That may dampen his enthusiasm for the change.

—HARRISON G. BROWN,
Supervisor of Standards,
Crompton & Knowles Loom Works.

Photo by courtesy of
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The solid shim that p-e-e-l-s for adjustment

LAMINUM

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558

When a customer wants to purchase a piece of equipment and requests certain changes in design to meet his working conditions, who is to pass judgment on his ideas and say whether right or wrong?

Aren't all inventors wrong and foolish in their designs? We still make changes and accept radical designs. Why worry about the average engineer turning up his nose? That is a characteristic of the profession. Make the change requested, but do not overcharge. You may gain by the change you never thought of before. The equipment builder may feel that he knows what is best to get desired results, but there are few pieces of equipment installed in progressive plants today that do not have changes, gadgets and modifications applied after they have been put into service.

Some of these modifications are really inventions and the equipment builder who felt that he knew what was best, would be surprised if he saw some of his equipment and how much better it functioned with the customer's applied ideas. —W. E. FISHER.

One-Man Shop

The fact that the men in Al's little shop were marking time while he was absent, revealed the need of providing adequate supervision at such times and that Al had fallen down on his job; so much so that he learned nothing from the warning and does not yet realize that if he had a long-continued illness his business would be in danger of complete collapse.

Since Al does not feel the need of a non-producing assistant, his shop is evidently in that half-way condition that will support one non-producer, but will not support two. Therefore, his obvious duty is to select one or more of his best workmen and train them sufficiently to manage the shop whenever he is absent. The men's reaction to taking advice or instructions from a fellow workman, would depend upon Al's ability and good judgment in selecting the proper man to act for him in his absence.

Al should not wait until his absence is an actual fact before making his choice, but should select and train his men before that time, so that they will know just what he expects them to do in cases of emergency. He should also inform the other workmen, that they will know when and from whom and to what extent they are to take instructions from anyone else.

—L. BROWN,
Montreal, Canada.

Hiring Older Men

Although young men from 20 to 25 are generally full of physical vigor, experience in engineering plants has proved that they have neither the manual skill or the practical knowledge of the skilled men of 45. Personally, I would prefer to employ men between the ages of 45 and 55, rather than young men of 20 or 25, because they have had longer experience and are in their intellectual prime.

A few years ago, the railroad company which employed the writer as a shop foreman, raised the age at which men were hired, thus reversing Dr. Osborn's policy which has done the machine industry so much harm and has worked such cruel hardships on many capable men of middle age. That company now gives preference to men over 35 and retains them in service until they reach 65, when they are entitled to a pension from the state.

Men for heavy assembling jobs need strength, edurance, intelligence and knowledge of machinery. For light assembling jobs in the average shop, experience, training, deftness of hand and patience are essentials. I believe that men from 45 to 50 are far more capable for both light and heavy assembling jobs than are young men of 20 or 25 years of age. —A. EYLES,
St. Albans, Hertfordshire, England.

Reading the help-wanted columns in trade journals and the daily press will leave no doubt that the man of 45 is not looked upon with favor by employers who are looking for "experienced" men of 30 or 35. An industry that bewails the fact that it is unable to secure sufficient skilled labor cannot consistently advertise that it has no use for men over 40 years of age.

No doubt there are some machine-shop jobs where the man of more mature years may show to disadvantage against the younger man, but they are mostly jobs requiring brawn and agility instead of skill and knowledge.

It is frequently said of the man of 45 that he has lost some of his enthusiasm for his job; that he is not as mentally alert nor receptive to new ideas; and that he has not the same initiative as the younger man. Some of these things may be true in individual cases, but inquiry would probably reveal that frequently the younger man never had all or any of those good qualities.

There are many active industrial leaders who have long passed the age at which most men retire. If it were suggested to them that they had passed the age limit and must be lacking in some of the necessary qualifications for their jobs, their expressions of disapproval would be more forcible than polite. —W. L. WATERHOUSE,
Bristol, England.

Every now and then we hear that certain employers will not hire men who are over 45 years of age. It is undoubtedly true that where laborious work is involved, men at 45 or 50 years of age are not physically able to keep up with younger men. On the other hand, there are certain types of labor in the majority of our industries requiring skill and dexterity that can only be developed over a period of years.

What are the real issues behind the age limit? Is it being repeated and adopted by those who have heard that others have adopted such a policy

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without first trying to determine how much truth there is to it? Have the large companies adopted such a policy because of their pension and insurance plans? If so, might not that be one of the contributing reasons why so many small plants that do not have an age limit can compete with the larger plants? If it were possible to determine the reasons behind such a policy, a solution might be more readily reached. —STANLEY P. FISHER.

SEEN AND HEARD

JOHN R. GODFREY

Gamma Rays for the Shop

Those who weep about the passing of the all-around machinist are wasting their time. We don't need them in a lot of shops except for keeping the plant running. However, we are bringing so many new things into the shop that there is hardly enough capacity in any one man to know them all. The old time machinist who thought he knew how to harden and temper tools would be lost today with the many kinds of steel that require different treatments. Electric and torch welding are also trades by themselves.

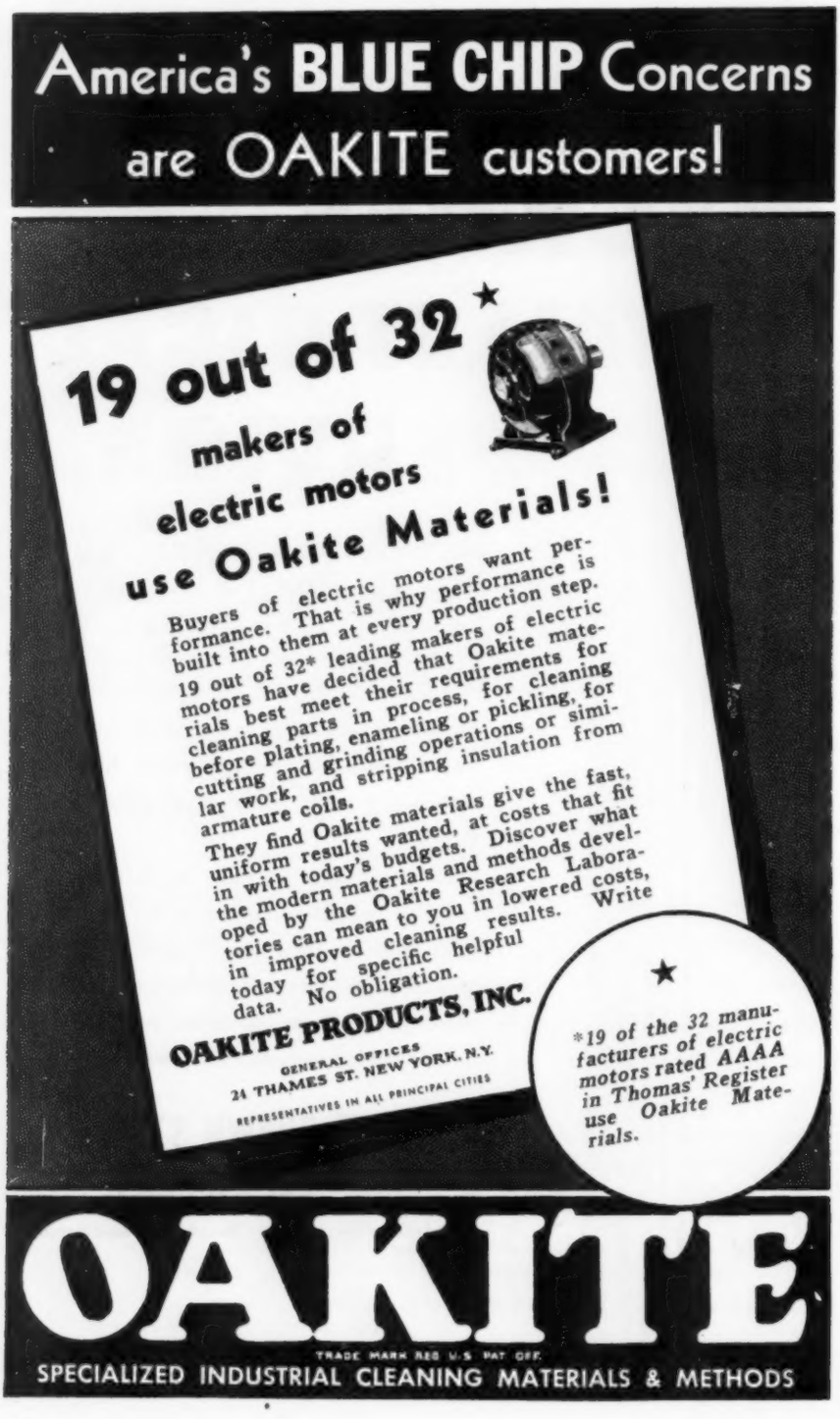
Now comes the use of Gamma rays for inspecting castings, forgings and welded joints. Though they are not cheap, they are said to be more effective than X-rays and will penetrate up to 10 in. of metal and radiograph what they see. One writer figures that they can test steel up to 3 in. thick for a total cost of less than 1½ cents a pound. How many all-around men could add this to their accomplishments?

Private Planes

In the early days of the automobile it was distinctly a summer vehicle. Memories of "get out and get under" had no appeal on snowy roads or at low temperatures. Now, there are few cases where the family car is out of commission during the winter. A somewhat similar increase in use is noted in the private airplane. The average private plane now flies more in 90 days than it did in a year in 1930. Instead of 175 hours in the air four years ago the average is now nearer 800 hours. Fair weather and home airports no longer govern the flying of the private plane. Long cross country flights in daylight or darkness, and in weather that formerly kept planes grounded are now fairly common. How rapidly the use of private planes will grow is anybody's guess.

Smooth Handwheels

Fine appearance and utility may be twins in some cases. But there are times when they are antagonistic, at least to some extent. One case in point is the handwheel on a heavy lathe carriage. This was a special-purpose machine and the designer and builder had come up through the shop. He knew how slippery a highly polished, smooth-rimmed handwheel can be when the operator's hands are a bit greasy, as they frequently are. Therefore he left the handwheels rough and made smooth contoured grips on the inside, much as we now do on automobile steering wheels. The rough wheels didn't suit the salesmen and once in a while a customer objected. One of these refused to place an order unless the handwheels were polished. But that's another story.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19 out of 32 ★ makers of electric motors use Oakite Materials!
Buyers of electric motors want performance. That is why performance is built into them at every production step. 19 out of 32* leading makers of electric motors have decided that Oakite materials best meet their requirements for cleaning parts in process, for cleaning before plating, enameling or pickling, for cutting and grinding operations or similar work, and stripping insulation from armature coils.
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